

THE PRESIDENT'S PAGE

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BROADCAST throughout our land is the cry that it is the lack of confidence which impedes business recovery. With the best minds of the country taxed to the utmost in an effort to analyze the situation and to find an answer, no one has yet pointed out exactly where confidence is lacking; whether it is in the Government, in banks, in building and loan associations, in business leadership, in general business, or whether it may not actually be in ourselves as individuals.

Conferences have been held, legislation enacted, and formulas prescribed by government authorities, business leaders, professors, self-styled economists, philosophers, cults and reformers in the hope of discovering a sound method of treatment of the economic ill. From all of these sources we have had suggestions on what to do, how to do it, and when to do it. For the past three years there has been a continuous shower of voluntary recommendations for coping with the situation. None of these has made any appreciable impression on the minds of the people, nor have the panaceas suggested contributed much or anything toward the restoration of business prosperity.

In the formulation of future budgets and programs, careful consideration should be given to past errors. Let it be said though that the colossal mistakes made in the past should not be permitted to stand in the way of our determination to make things better for the future. There is no use trying to correct the mistakes of the past except in so far as those experiences may be of value for future guidance.

We all want the return of prosperity, and yet we are told that to attain it confidence must first be restored. Confidence in whom? In what? This is the composite thought of our people. We wait with anxiety for some leader to show us the way. For three years we have looked in vain for some Moses to lead us out of the wilderness, but what are we doing about it as individuals?

Confidence! Yes, confidence first in myself and in my business. How can I expect people to have confidence

in me if I do not have confidence in myself? It is unnatural for people to be persuaded to do things or to believe in things contrary to their inherent inclination. The continued discussion of the depression and its causes with the constant offering of theoretical remedies is but still further agitating the already disturbed world.

The depression now prevailing is a necessary factor in the aftermath of a world war, and there can be no effective panacea nor antidote prescribed to relieve the pressure. The water in the pond is muddy. It will clear up in due time. Agitation only makes it worse and delays the natural order. We must deal with the situation as it is and make the best of it.

Instead of waiting for leadership, let each of us become a leader, and by this mass leadership we will soon be restored to more normal ways of living. If business people, professionals, press writers and pulpit orators will cease agitating the subject and settle down to the point of putting confidence in themselves, the natural order will soon be brought about. If agitation is continued, the water in the pond will evaporate and we will all settle down in the mud. God help us if it comes to that.

I have resolved to put confidence in myself, and by so doing expect to merit the confidence of others in me. If others will make the same resolution it will become contagious and confidence will be stimulated to the fever heat of victory. When that happens I will buy a new hat which I have so long needed, another conservative will buy a pair of shoes, another a suit of clothes, and presently we will all be providing ourselves with the necessities we thought we should be deprived of during this depression. The result will be that the stock on the shelves in our stores will be depleted; the storekeeper will buy more goods, the manufacturer must employ more men to make the new goods, and thus unemployment will be gradually decreased. This movement can mean nothing else than the resumption of normal business activities.



By

JOHN F. OHMER

President, Ohmer Register Co.

ASSUMING that seven years is the normal economical life of a motor truck, there are 700,795 commercial vehicles on the road today that have outlived their economic life.

If you assume that five years is the normal economical life of a motor truck, then there are 1,809,314 commercial vehicles on the road today that have outlived their economic span.

Whichever figure you accept, it is obvious that the motor truck industry has an immediate potential replacement market of huge proportions. And because so many aged vehicles are continuing in operation it is equally obvious that there also exists an immediate potential maintenance market such as the industry has never had.

These are the only consoling facts that were bequeathed the industry by the year 1932. Otherwise it was an unprecedented disappointment. In three particulars it must be looked upon as a notorious year:

1. Because it was the first year in the history of the truck industry that registrations failed to show an increase over the previous year. (The loss was 6.3 per cent.)

2. Because domestic sales were lower than in any year since 1921. In 1921 new trucks sold totaled 142,000; in 1932, 180,000.

3. Because truck production also was lower than in any year since 1921. (147,550 in 1921 and 245,285 in 1932.)

The 180,000 sold in 1932 represented a 42 per cent drop from 1931, and a 65 per cent drop from 1929, which was the industry's banner year.

The depressed condition of business in general was unquestionably the major cause of the industry's poor showing. Truck users with good credit standings found themselves under pressure to effect still further economies. Not only did they have less or no money available for capital expenditures, but they found themselves compelled to cut down the cost of operating existing equipment. It was because of the latter measure that 1932 did not come up to expectations even as a maintenance year. With hundreds of thousands of trucks operating beyond the economic age limit it was reasonable to expect the parts and service business to experience a boom year. Reports from the trade and from factories indicate, however, that maintenance business was only fair throughout the year. Operators for the most part kept away from service shops just as long as they possibly could. There is a ray of hope for the trade in this occurrence also, because the day of reckoning on neglected trucks is considerably advanced.



Truck Sales and Production

	Production	% Decr.	Domestic Sales	% Decr.	*Foreign Sales	% Decr.	Total Sales	% Decr.
1932	245,285	43.5	180,516	42.5	56,605	54.7	237,121	45.9
1931	434,176	27.6	313,884	23.6	125,037	33.0	438,921	26.5
1930	599,991	27.4	410,699	22.0	186,701	44.9	597,400	31.0
1929	826,817	....	527,057	....	338,929	....	865,986	....

*U. S. Exports including Foreign Assemblies plus Canadian Production

TRUCK REPLACEMENT MARKET GROWS HUGER

1,809,314 Trucks on the Road Are More Than Five Years Old. 700,795 Are In Excess of Seven Years

By GEORGE T. HOOK

Editor, Commercial Car Journal

Doubtless more trucks would have been sold if the trade had been as liberal in its extension of credit as in years past. There were plenty of poor credit risks around who would have been only too glad to oblige with a signature on the dotted line. But if the depression has taught the trade anything, it has taught it to study a prospect's credit standing carefully before negotiating a sale.

If this lesson of credit should remain with the industry when business improves then the depression, instead of being reviled, will deserve respectful mention.

While general business conditions were largely responsible for prospective buyers deferring their purchases, restrictive truck legislation and the threat of impending legislation served to make many buyers uncertain and to postpone investments in new equipment until the legislative skies, which are dark indeed, clear. This was especially true of users of heavy-duty vehicles. Anti-truck interests are concentrating on the heavier types of units. The practically confiscatory laws adopted by several states have given rise to the fear that other states may follow suit, thus demoralizing potential users. It is quite likely that uncertainty will dominate the heavy-duty market until doubt regarding legislative restrictions is dispelled.

While the 16 per cent gain in trailer registrations might be regarded as an indication that the trailer interests allied with the truck industry enjoyed a period of remarkable prosperity during 1932, the trailer interests themselves would be

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TABLE OF TRUCK REPLACEMENTS

	Total Registrations	Increase in Registrations	Sales by Dealers	Replacement or Scrappage
1923	1,801,433	313,238	360,668	47,430
1924	2,131,332	329,899	351,258	21,359
1925	2,441,709	310,377	424,014	113,637
1926	2,764,222	322,513	418,166	95,653
1927	2,896,886	132,664	330,569	197,905
1928	3,113,999	217,113	379,668	162,555
1929	3,379,854	265,855	527,057	261,202
1930	3,480,939	101,085	410,699	309,614
1931	3,484,291	3,352	313,884	310,532
1932	3,266,374	217,917	180,516	398,433

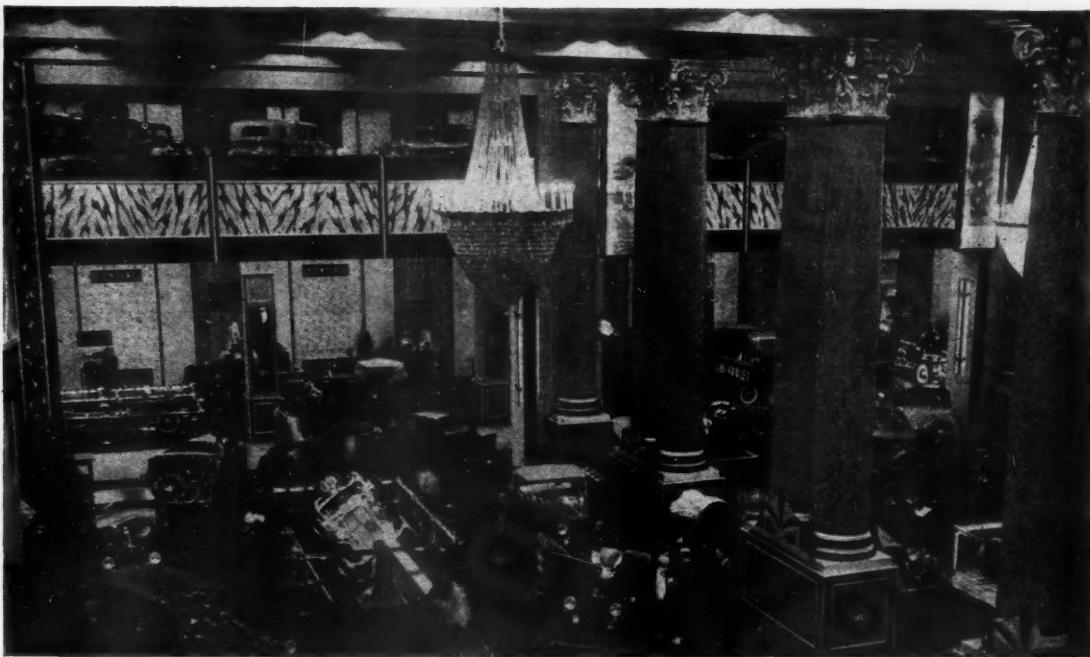
1932 TRUCK AND TRAILER REGISTRATIONS

TRUCKS

TRAILERS

	1932	1931	% Change	1932	1931	% Change
Ala.	32,218	33,895	-4.9	3,948	3,279	+20.0
Ariz.	14,848	12,633	+14.9	1,765	1,623	+9.0
Ark.	19,800	22,000	-10.0	2,300	2,800	-17.8
Calif.	240,854	239,213	+1.0	65,800	59,057	+11.5
Colo.	30,006	32,082	-6.2	563	258	+118.0
Conn.	51,577	53,274	-3.2	1,013	1,062	-4.6
Del.	9,410	9,991	-5.8	649	517	+25.3
D. of C.	19,215	19,809	-3.0	...	...	...
Fla.	37,574	50,819	-26.1	7,522	6,751	+11.5
Ga.	41,532	45,736	-9.1	4,021	3,317	+21.5
Idaho	13,99	15,435	-9.9	6,500	7,558	-14.0
Ill.	181,715	201,509	-9.8	8,950	9,283	-3.5
Ind.	119,855	129,192	-7.1	23,840	17,807	+33.8
Iowa	75,057	80,752	-7.0	2,833	3,207	-11.5
Kan.	72,000	80,434	-10.5	1,975	1,778	+11.2
Ky.	34,765	36,670	-5.1	*	*	...
La.	43,961	47,783	-8.0	6,624	5,445	+22.0
Maine	32,525	35,711	-8.6	4,220	3,084	+36.8
Md.	34,334	35,904	-4.3	1,327	1,128	+11.8
Mass.	103,551	103,888	-0.3	525	650	-19.2
Mich.	135,094	152,635	-11.4	77,538	61,932	+25.2
Minn.	101,651	109,984	-7.5	21,529	18,329	+17.4
Miss.	27,649	30,721	-9.9	2,000	2,560	-21.8
Mo.	99,005	96,000	+3.0	9,778	5,356	+83.0
Mont.	20,508	24,037	-14.5	61	52	+17.3
Neb.	53,369	59,848	-10.8	13,531	15,737	-14.0
Nev.	6,782	6,950	-2.5	564	411	+37.1
N. Hamp.	18,920	18,671	+1.6	1,448	1,137	+27.3
N. J.	133,658	135,098	-1.5	2,863	2,916	-1.8
N. Mex.	14,628	15,521	-5.8	802	...	...
N. York	325,471	347,443	-6.2	13,922	13,250	+5.0
N. Car.	47,300	54,425	-13.0	7,800	8,268	-5.6
N. D.	23,397	26,588	-11.8	...	...	...
Ohio	166,720	191,929	-13.0	45,700	32,717	+40.0
Okl.	47,175	54,585	-13.6	...	...	...
Ore.	24,148	24,288	-0.5	1,887	2,361	-20.2
Penna.	214,948	219,696	-2.2	7,835	6,308	+24.3
R. I.	19,075	20,112	-5.0	95	90	+5.8
S. Car.	21,909	24,724	-11.3	2,121	2,100	+1.0
S. Dak.	19,372	23,816	-18.7	8,611	4,988	+73.0
Tenn.	29,975	35,096	-14.4	3,294	2,696	+22.0
Tex.	195,144	210,850	-7.1	35,890	33,798	+6.3
Utah	16,762	17,577	-5.1	879	767	+14.6
Vt.	8,365	8,453	-1.0	519	457	+13.5
Va.	64,526	58,991	+9.3	1,740	1,582	+10.0
Wash.	67,700	61,114	+11.0	4,770	3,000	+59.0
W. Va.	34,085	38,907	-10.7	1,785	1,270	+40.5
Wis.	111,370	118,223	-5.7	1,118	1,007	+11.8
Wyo.	9,600	10,917	-11.9	*	...	...
Total.....	3,266,374	3,484,291	-6.3%	408,928	352,495	+15.8%

* Included with trucks.



THE NEW YORK SHOW AS A FLEET MAN WOULD SEE IT

Author's Note.—This is an account of my trip through both the truck and passenger exhibits of the New York Automobile Show for the purpose of recording the things of particular interest to fleet men. It is based upon what I saw and, of no less importance, what I heard.—James W. Cottrell.

MOTOR vehicles which are simpler to operate but not to maintain were revealed in the 1933 offerings of manufacturers at the National Shows. Many functions formerly performed by the driver, such as spark advance, manipulation of the choke and increasing the idling speed of a cold engine are now done automatically. Starting the engine has been reduced to the simple operation of pushing down on the accelerator. Clutches engage and disengage automatically.

Complexities in maintenance are in sight in spite of the fact that many changes have been made in design to insure longer life for wearing parts and/or greater intervals between adjustments and repairs. Exhaust valve inserts were featured by several makers; needle bearing universals do not resent being neglected; according to booth attendants, many spring shackles require little or no lubrication, thin-shell interchangeable connecting rod bearings make it possible

to install new bearings without removing rod and piston assemblies. And so it goes.

These vehicles which are easier to drive and which will require less major repair work and lubrication will require minor repairs and adjustments not even thought of a few years ago. Consider thermostats, for example. Fleet men are accustomed to the idea of a thermostat in the cooling water outlet pipe on a cylinder head but they will probably see thermostats in hitherto unsuspected places. The automatic chokes are, of course, operated by thermostats and the same instrument actuates a little rod which holds the throttle open a bit more than usual when the engine is cold, to prevent stalling while idling. Exhaust heating of the intake is common and this has been controlled from the dash or by an almost permanent "season" adjustment. This job also has been taken over by an obliging and never-forgetting thermostat.

Therefore, as one engineer laughingly put it "shops will have to have small ovens with glass in the doors and thermometers to check operation of the thermostats."

Mechanics who hunted pin holes in branched intake manifold castings in the old days to find minute leaks are chuckling over the generous use of vacuum on present day vehicles. The windshield wiper was just the fore-

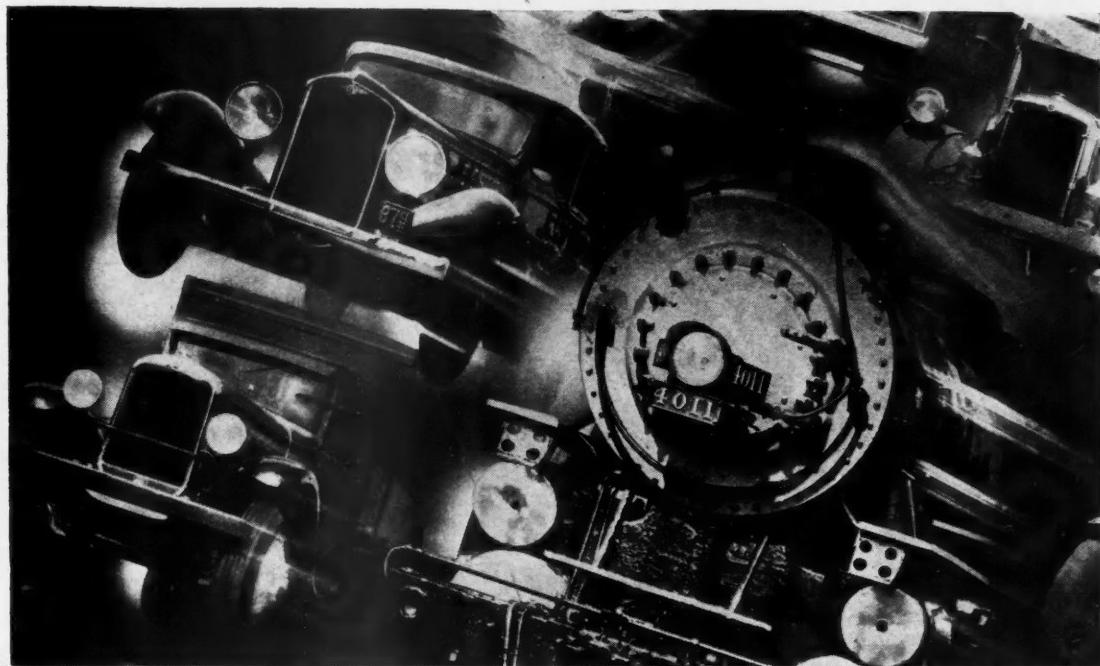
Automatic Devices Snag Progress Made to Simplify Maintenance By Means of Longer-Wearing Parts

runner of a flock of devices operated by suction. The B-K booster on brakes is no novelty in the truck field and now the same principle is being applied to operate clutches automatically.

Although these supplementary devices require relatively little maintenance they must be inspected regularly and the plumbing interferes to a certain extent with other jobs. This is true with other auxiliaries, air filters and intake silencers, for example, make it more difficult to remove and replace carburetors. In case of carburetors, however, the downdraft type is much more accessible than the conventional updraft type.

Power of passenger cars has been increased by raising compression ratio, the average for 1933 being 5.4, adding to piston displacement and working the piston displacement harder. Passenger cars are being driven faster and kept at high speed

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Courtesy American Brake Materials Corp.



COORDINATION IS WAY TO END DISTRIBUTION WASTE

Settlement of Rail-Truck Differences Must Secure For Shipper Best Service At Lowest Possible Cost

By COL. C. O. SHERRILL

Vice-President, The Kroger Grocery and Baking Company

In order to utilize the huge output of products of farm and factory being produced today there must be built up a corresponding efficiency and economy of distribution in order that the consumer may receive the full advantage of the low cost of production, while the producer receives fair and compensatory payment for his products.

There is a notable waste in distribution at the present time. In the United States this waste has been estimated by the Department of Commerce at ten billion dollars per year. Considerable part of this waste is due to the inefficiency of transportation methods and the best efforts of shippers and distributors must be directed to the elimination of this huge waste.

Our modern transportation facilities consist, first, of the railways; second, our highways; third, our waterways, and fourth, our airways. No one of these methods forms a complete self-contained transportation system which alone can handle one's business. Our railways, without the assistance of terminal and feeder motor vehicles, could not supply the needs of our population for even a single week, much less provide all their needs every day in the year. Our motor trucks, while of the utmost value as adjuncts of the railways and useful to a certain extent as independent transportation agencies, could not possibly distribute more than approximately 5 per cent of our production. Waterways alone would be almost negligible in capacity, having also much less flexibility than either railways or highways on account of the limited number of communities they reach. Aircraft cannot by any stretch of the imagination be considered as competing with the other agencies either in tonnage capacity, efficiency or economy and without trucks and buses for terminal and feeder work, aircraft would lose its present limited usefulness in transportation.

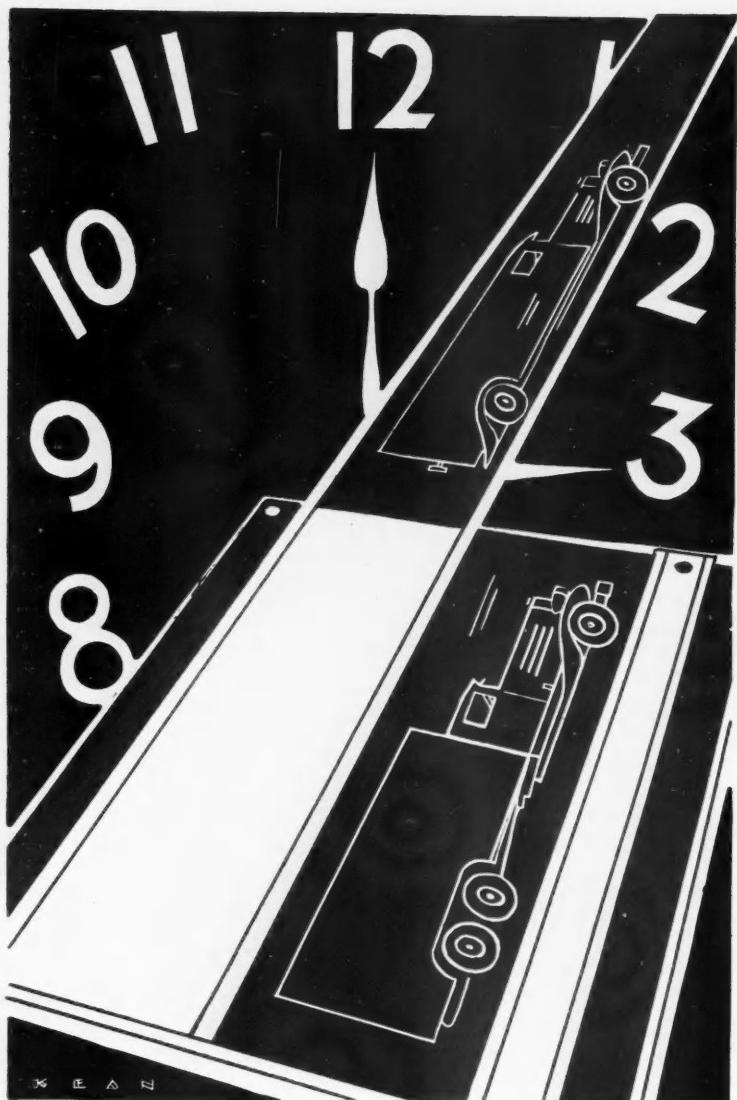
The railway is the ideal long distance mass distribution agency. The truck is the best and most convenient short distance door-to-door handling agency. The water carrier is usually

the cheapest, though generally the slowest for mass distribution, and is very useful where time is not an important element and where low cost non-perishable bulk merchandise is to be moved. The aircraft is the acme of speed for moderate to extremely long distance hauls of light weight, high value perishable freight and for passengers on urgent missions.

It will be seen, therefore, that each of our four great transportation agencies of today has its distinct place, its special limitations and its particular value in our scheme of distribution. The principal difficulty with the existing transportation situation is that no one has yet solved fully and satisfactorily the proper coordination of all these agencies into a complete system of transportation, in which each kind of unit will be assigned its proper place in accordance with its merits and limitations.

Up to the present time there has been a bitter fight between the proponents of each form of transportation, not having in view the welfare of the producer, the shipper and consumer, but rather the destruction of other competing agencies of transportation save the particular one in which the particular group is interested. For instance, the railways have long been and are now engaged in a war to the finish against highway using vehicles and the waterways, in the effort to

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SERVICING CAN BE HALVED BY DESIGN

I AM not an engineer nor a salesman but only a customer, as you might say. In my daily task of taking care of a fleet of 40 bakery trucks, a number of problems present themselves for solution, and, of course, even a baker has to watch his step and operate as economically as possible, so I believe the first economy is the proper selection of equipment.

I wonder if the engineer and the truck sales manager ever thought of the fact that other things enter into the life of a motor truck besides the sale of it. Do they realize that it has to run and deliver goods, also to do this it has to be repaired, yes, actually has to be taken apart sometimes and serviced?

When the engineer does realize this,

Says W. RAY MOREHOUSE

Service Manager

Morehouse Baking Co., Lawrence, Mass.

Although he is "only a customer," as he puts it, operating 40 trucks, Mr. Morehouse dares to suggest that what bakers, florists, grocers, etc., want is a good 1-ton (not 1½-ton) standard-from-year-to-year-on-the-main-parts light truck for work that is really light, so that they can run it at a reduced maintenance cost.

"Truck makers," he says "are now making a very good general contractor's truck and talking us light-truck users into using it."

Mr. Morehouse outlines the light 1-ton truck he would like to see designed.

I think we will get a truck that can be serviced in one-half the time necessary for those we are now running. Why make a motor in such a way that in order to get at the valves one must take off carburetors, manifolds, gas pumps, etc. Why is it necessary to take flywheel housings or tie rods off to take down the crankcase or take rear ends out to get at the clutch? Still they think they are selling service in the form of a truck.

I have found it necessary to inspect and adjust every truck at a predetermined mileage to get good dependable results, and as this inspection includes all motor adjustments to be checked, it takes lots of time on some makes of trucks to do it. And let me tell you, time is money.

Suppose I outline an imaginary truck that would handle our loads and compare its parts as I go along with what is on the market. To start with, the salesman who presents a truck that needs no repairs is all wet, and the buyer who buys one on the same understanding is just as foolish. So, if we agree that it must be repaired, why not have it easy to get at? One of the regular jobs on any motor vehicle is to grind valves. If the valves on a valve-in-the-head motor can be ground and reseated in about one-half the time required on an L-head motor, why not make the motor of our imaginary truck with valve-in-the-head construction. If a fleet of trucks is to be serviced, and they are all valve-in-the-head motors, a spare head with the valves all ground in could be stocked in the stockroom making the tie up of a truck unnecessary for this very important service job. By the way, this head should go on and off with as few bolts as possible. If the engineer wants to get out a new creation to help sales, tell him to let the cylinder head and valves alone so several years' models will be interchangeable.

When a truck leaves the garage on a cold morning and the driver "gives it the gun" what chance has the motor got to stand this abuse unless we have an oil heater and water thermostat to make the oil go where it is wanted? So, our motor should have both of these units incorporated in it.

As this type of service is very hard on motors (and what kind of service is not), our motor should have large bearings and pressure feed to both main and con rod bearings. The crankcase should be a simple job to drop or put up again without all the fussy small gaskets at the front and back and without having to dismantle the front axle tie-rod or flywheel housing. When we have trouble we want to get at it pronto.

Clutches are improving, but they can be made longer wearing. A dry disk clutch with a throw-out bearing with oil reservoir large enough so it does not have to be oiled each day or hundred miles is what we will put on our truck. If the present clutches

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THE question of a salesman's most productive years expressed in terms of age is a subject which has been discussed by almost every sales executive for a long time, with a marked tendency in recent years to favor the younger men, men in their twenties and, in many instances, recent college graduates—and then again we read so frequently newspaper classified advertisements calling for experienced salesmen "not over forty."

Many manufacturers in the truck industry and in other industries, have adopted the idea of not employing salesmen over 35 years of age, but the age of 40 seems now to be generally accepted as the age limit for new men. In fact, it is so extensively accepted that it has almost become a "slogan" in the truck business.

Just why a barrier should be set against sales applicants 40 or over in age is a question many sales executives I have talked with seem a little uncertain of when closely questioned upon the subject. The standard seems to have been adopted more or less mechanically. As one sales executive expressed it, "Some of our policies have been handed down through the years from one sales manager to his successor and accepted for not much better reason than, well—if it was good enough for Charley, it's good enough for me." And so, to a great extent, it may be with this idea of age limit.

Nevertheless, the subject seemed seriously important enough to analyze and investigate. After discussing the matter with several sales executives I found those who favor salesmen 35 years of age or younger quite set in their ideas. A few preferred men between 30 and 40, but were not particularly unfavorable toward new men 40 or older if in good health. One executive stated he did not care how old a salesman was if he could sell.

The opinions of these factory executives appeared to be based largely upon precedent. This conclusion is substantiated by the fact that nearly every one of these executives was a long ways from certain concerning the average salesman's age in his own sales organization.

The principal objections in considering sales applicants 40 years of age or older, assuming they are enjoying good health, are about as follows:

Failure to stick with previous employer or employers, indicating a lack of those qualifications necessary for success; set opinions through previous training discouraging ready acceptance of new or different ideas; lack of energy and enthusiasm; lack of ambition due to any number of reasons depending upon past experience; limited number of future productive years in sales work, etc. However, upon closer questioning, it was generally admitted that young men may be self opinionated, quick to criticize, lazy, ambitious to make money easily,



WHY SHOULD "40" BAR A SALESMAN?

Asks A SALES MANAGER

Who is Over 40 Himself and Employed by
One of Our Largest Truck Manufacturers

Age should not be a bar, he says, because:

"There is still a premium on experience;

"There is a poise, self-reliance and a definite attitude that usually goes along with experience that inspires confidence, which is a highly important factor in sales work;

"It is bound to discourage younger men in sales work for corporations, who barring early death are sure to arrive at 40, feeling that unless they reach an executive position prior to 40 their opportunities are extremely limited."

Comments of readers are invited.

unsettled, uncertain and lacking in certain qualifications for an indefinite period of time, all dependent upon the big factor "experience."

Every concern has and is training a certain number of young men to become efficient salesmen for some competitors. In fact the odds are more favorable that mature, experienced men will "stick" to an organization longer, and particularly under trying conditions, than the younger men. The younger man is looking for new worlds to conquer and is easily enticed by the offer of a few more dollars from another company seeking his services, or perhaps is so flattered by the knowledge some one else is bidding for his services he immediately develops a case of head enlargement

and asks for a big raise in salary. But the big thing lacking in most younger men is experience and there is still a premium on that. There is a poise, self-reliance and a definite attitude that usually goes along with experience that inspires confidence, which is such a highly important factor in sales work.

But there is absolutely no question of the increasing tendency to bar the door to the middle-aged salesman, and it should be needless to say that this practice is a rank injustice to thousands of capable men who have just arrived at the most productive stage of their lives, assuming, of course, they are in good health. Does this unwritten law against the employment of middle-aged salesmen so assiduously adhered to by so many sales executives mean that the salesman reaching that age should be placed upon the shelf for the rest of his life or seek employment in other fields of endeavor? Why should it? Practically every sales manager in the truck business or any other merchandising business for that matter will tell you, if he will, that his greatest worry is procuring good salesmen. And yet the large majority of them limit their greatest possibilities of procuring this type of salesman by placing a stop at 40. There are brilliant aggressive young salesmen available, and almost as many middle-aged salesmen with every qualification necessary plus "experience," so after all when we carefully weigh this highly important subject, it is not a question of age—it all depends "on the man."

● Training is Experience

It would indeed be rather difficult to procure men for a large sales organization all of the age range considered most productive by the average manager, and training a large number of young men is not only expensive from the investment standpoint but a costly annihilator of time.

The general yardstick used for measuring the young sales applicant is usually composed of the following factors—appearance, address, education, initiative, industry and personality. Experience, of course, is rather limited. If an industrial corporation wants to fill a highly responsible position, it picks a man of experience, and so it goes with practically every phase of business and even in professional life. Yet in sales work, a most scientific procedure, believe it or not, and in merchandising a highly specialized piece of mechanism such as a motor truck, we attempt to place "forty and experience" on the shelf.

It frequently becomes necessary to transfer salesmen from one territory to another, and in the truck industry this is done more frequently than necessary. If so, which would you consider more advantageous and in the best interests of the company, to transfer John Smith, age 42, with 15 years of service, from Newark to Chi-

cago, or employ Robert Hill, age 42, a new man to your company, but with a wide acquaintance in Chicago? Both are fundamentally right, enjoying good health and are of equal sales ability. John Smith knows your policies and product backwards, but doesn't know a thing about the Chicago market, while Robert Hill doesn't know a thing about your policies or product but has valuable contacts in Chicago and is most familiar with every street in the city?

EXPERIENCE

There is an old Chinese proverb:

"If you wish to know the road before you, ask of those who have traveled it."

What has this to do with age? You may ask. Nothing, except the question naturally arises if you were going to transplant John Smith, age 42, to Chicago to strengthen your organization there, why not employ Robert Hill, age 42, as long as you need an additional man at that point? There is an old Chinese proverb: "If you wish to know the road before you, ask of those who have traveled it."

Perhaps group insurance has unintentionally influenced this complex regarding age, or the Pension System with a few companies may have contributed generally toward the idea. However, regardless of the cause, the effect is bound to a certain extent to discourage younger men in sales work for corporations, who barring early death are bound to arrive at 40, feeling that unless they reach an executive position prior to 40 their opportunities are extremely limited.

Not long ago this question of age and sales efficiency came up in a rather accidental way while two sales executives of a fairly large truck company were discussing things in general. The elder executive was a firm believer that salesmen over 40 were slipping in general sales efficiency, while his assistant had a viewpoint to the contrary. This conversation led to an actual check of the records to ascertain the average age of their sales organization. It was found that the average age per salesman was 35 years, but that approximately 40 per cent of the total were men of 39 years or over. Upon further analysis it was found that the men 39 years of age or over produced 58 per cent of the business—not only for that year but for two in a row.

National account sales work is conceded to require salesmen of long experience and above average sales ability, and analysis of this department showed an average age of exactly 41. The size of the entire sales organization referred to was slightly over 150 salesmen.

A similar check was made by an-

other truck company of its sales organization in the eastern territory and whereas the age average was approximately 33, a further check disclosed the fact that the salesmen 35 or over, were producing the larger proportion of the business. While it was true the majority of the older men had covered their respective accounts for some time, and they had a rather choice selection of accounts from a potential standpoint, nevertheless, further check disclosed the fact they had procured within 10 per cent as many new accounts as the younger men had written for the year.

It is odd, but true nevertheless, that when salesmen are employed upon a straight commission basis, the question of age does not seem to be such a serious factor. The writer is not attempting in any respect to question the advisability of employing young aggressive salesmen, in fact, it is highly important to do so, but any sales organization should be balanced by "experience," and assuredly we should get away from any delusion with regard to "forty."

It is most difficult to understand the reasoning back of the idea that a salesman 45 years of age doing a good job for one concern cannot do practically the same job for another company. The argument may be advanced at this point that his real productive future years in sales work are limited, yet on the other hand, we have no particular guarantee that a young man will last longer with any one concern.

● "Forties" Are Foundation

There are employed today in our industry thousands of salesmen beyond the 40 mark or closely approaching that age, not only doing outstanding work but practically forming the foundation of nearly every sales organization. If this is correct, then why in the name of common sense should the status of any of these men materially change if for one reason or another they should seek employment in your organization.

The salesman 30 or less should be looking forward to great opportunities with real force and ambition. At 45 or over he should have attained judgment and experience, learned where the pitfalls are, and know that which leads to success. His experience should enable him to procure more business with less fuss and wasted energy. His mature poise should take him into his prospects' confidence quicker and with greater respect.

If a man is lazy it matters not whether he is below 30 or above 40. If he is a hard worker and plans his work and really wants to succeed, he can, regardless of his age. It all depends upon viewpoint and the urge to accomplish success.

Upon careful reflection, I believe most of us would agree that age has nothing to do with success and making money.

Our Own Ear to the Ground Department

Smoke from Baldwin Stacks

If there's any truth in the old saying that "where's there smoke there's sure to be fire," then the Baldwin Locomotive Works are going to be in the business of supplying highway transportation before very long. If what we hear from unofficial sources is to be credited, Baldwin will make its bow with a bus. The engine, it is said, will be Baldwin's own. After that the truck market will be invaded. Backers of the move seem to be convinced that because of its railroad contacts Baldwin should have the edge in corraling the railroad truck and bus purchases if, as and when restrictions on railroad ownership of truck and bus lines are lifted.

A Jig-Saw Puzzle for You

The Fisher brothers, you know, are heavily interested in Baldwin Locomotive. Ditto in General Motors Corp. And Yellow Truck & Coach is a subsidiary of General Motors Corp. Winton Engine Corp. is also a G.M. subsidiary. And big things are reported in the wind in connection with Winton. Not the least is the acquiring by Winton of one of the best known and ablest designing engineers in the truck industry. (There has been no official release of this fact.) Dovetail all these details and maybe you'll have something.

Biographical Note

Although no public announcement has been made, we understand authoritatively that H. D. Church has resigned as vice-president in charge of engineering of The White Co. Mr. Church joined White in 1925, according to our biographical file. He came over from the Chevrolet Motor Co. where he was assistant chief engineer. Prior to that he was chief truck engineer of the Packard Motor Car Co. Mr. Church is one of the best known and ablest designing engineers in the truck industry.

That Light-Duty Diesel

The sales manager of the company which is designing that light-duty Diesel engine mentioned in this column in December writes: "This small, light-weight engine is very much in the future and there isn't any possibility of its being available to anyone for a year or more from date." Maybe if we passed on to him a heap more of the inquiries that have come to this department since the item was published, the release date might be considerably advanced.

Anyway, It Keeps Bodies Cold

Mack Truck has developed a new system of refrigeration control for truck bodies. It is called Statotherm. (STATUS—fixed, and THERMO—heat.) Positive control of any desired temperature, with as little as one degree variance, is attained through a new form of hyper-sensitive thermostat with electrical relay control.

Is It the First Time or Not?

Lycoming Mfg. Co. ran a heavy-duty six-cylinder engine with specified maximum R.P.M. of around 2000 at 4300 R.P.M. to test its ability to stand up under the common operating practice of coasting and using the engine as brake. When last seen the engine had run 10 hours continuously and was still going strong. Engineers said it would be run to destruction and thought it was the first time such a test had been made.

From Our Ford Feed-Bag

Although Ford dealers will see to it that the new Ford V-8 cars are no secret after Saturday, Feb. 11, not much will be said about the trucks, which will play the Cinderella role for a time. Listen, therefore, to the latest word, unofficial but probably trustworthy—The new passenger-car chassis will be used for delivery purposes. There will be fewer factory-made body models with greater op-

Details of the new Fords with V-8 engines, procured before public announcement, will be found on page 43.

portunity for local body builders to make specials for the new chassis.

V-8 Optional on Truck

Either a four-cylinder engine or the new V-8 will be offered in the new trucks, with a difference in price. The four-cylinder engine will be very flexibly mounted in rubber to nullify the effects of vibration. The eight will be cushioned in rubber as in the passenger cars.

A Three-Fifty Job?

Rumors persist that Ford will enter the lowest price bracket fight with a car listing less than Continental and Willys. Here's one guess about it. The new job will carry the four-cylinder engine now in the truck, with plenty of wiggling ability, bodies will be about the same size as those on the first V-8. There will be a minimum of fancy stuff and accessories. The price? Three and one-half.

Buda's Truck Diesel Buds

Buda displayed a M.A.N. Diesel Model 6-DM-415 with six cylinders 4 x 5 developing 85 hp. at 2000 r.p.m. at the Motor Boat Show. The show model, which was of marine type, weighed 1560 lb. without reverse gearing. However, the engine was designed with truck service in mind and it probably will be presented to the truck field within the near future.

Welded Frames Come Apace

Frames which are welded together instead of being assembled with rivets are lighter and stronger, according to their advocates. The new Whitehead & Kales semi-trailer described elsewhere in this issue incorporates a welded frame. A new German M.A.N. truck also uses a welded frame. There may be others.

A 6-Wheel-Drive for Daytona?

An engineer who designed one of the first automobiles to make 120 m.p.h. on the Florida sands is toying with the idea of a six-wheel car with drive on all six wheels. Sir Malcomb Campbell is carrying 1500 lb. of lead to get traction on the rear wheels. Perhaps the next record holder will be of truck design.—J. W. C.

THE OVERLOAD

Get Out the Penknife

Here's one for your wallet or your glass-topped desk:

No man's opinions are entirely worthless—even a watch that won't run is right twice a day.

Sen. Ward, Meet Rep. Smith

Vernon A. Smith, vice-president and general manager of the Kenworth Motor Truck Corp., Seattle, Wash., is another truck man who can be depended on to give the motor truck a legislative fair deal. He was elected to the state house of representatives from the 46th Dist., Washington. (State Senator Ward of Maryland is a Brockway dealer. Remember? December?)

The Correct Word

Don't ask for gasoline. When you drive up to a pump, take a good look at the posted price with its itemized state, Federal and perhaps county and city taxes, and just ask for "Taxoline."

Nip Your Nostrils

We heard this one over the radio: "I see down in Louisiana they've succeeded in crossing a cabbage with an onion." "Is that so? I wonder what they'll call the cigar?"

A Real Success Story

T. G. Shadore, of the FWD company, should be an inspiring example to ambitious mechanics. Sixteen years ago he started with the FWD organization as a mechanic. After five years of shop work, final inspection and road testing he was placed in charge of the Rebuilt Division. From there he graduated to the sales division. The other day he was made assistant sales manager.

Truck Drivers, Ahoy!

Mildred "Babe" Didrikson, Texas' famous one-woman Olympic team, drove a 4-ton Dodge from Detroit to the Chicago Automobile Show. "I always thought," said Babe on arrival, "that truck driving was a tough job. It isn't; at least it wasn't a bit difficult to drive this one." So, to her jumping, running and throwing records, the Babe has added long-distance truck driving. Her professional standing is now established.

Just a Gluttonous Grandpa

Employer—"Late again, eh. Same excuse, I suppose?"

Office Boy—"Yes, sir. My grandmother died."

Employer—"What! again?"

Office Boy—"Sure! Can I help it if my grandfather was a bigamist?"

Let's Look at the Record

Did you read the newspaper accounts of the propeller-less and crash-proof airplane described as the invention of Dr. Adolf K. Rohrbach, of Berlin? It was the plane with the revolving wing or side paddle. Well, it's not as new or exclusive an idea as the newspapers told you. Haviland H. Platt, chief engineer of the Wilkens Mfg. Co., Philadelphia (Pedrick piston rings), filed application in 1927 for a patent on a revolving wing airplane. It was granted in March, 1931. Platt claims for his invention, if it proves practical, all of the performances (vertical ascent and descent, forward and backward flying and standing still in mid-air) predicted for the Rohrbach plane. It was Platt, by the way, who developed the process of manufacturing piston rings by heat shaping.

Chasing the "Chassicocci"

There's nothing personal about the germicidal treatments Federal Motor Truck Co. is giving all assembled frames, both bodies and cabs. The 5 per cent germicide solution is added to the waterproofing preparation. It is tough on termites and germs and prevents fungus growth. Being odorless and colorless it's particularly valuable in germ-proofing the wood on milk bodies. Oak blocks treated with the solution spent 1216 hours in a salt spray and showed only 8.3 per cent moisture.

Blessed, Indeed

"Blessed is the sales manager," says Prof. Hiram Pronto, "who is as good at selling as he is at criticising."

A Heart Throb

H. R. Bruah, president of the B & J Trailer Co., Chicago, on an eastern trip last month visited his father in a small Pennsylvania town. It was his first visit in many, many years. In the evening his father decided to post a letter in the post-office across the street. Mr. Bruah followed him out into the rain. On the way over, before his very eyes, an automobile struck and killed his father.

The Power of Advertising

In their successful effort to defeat adverse legislation truck operators of Oregon appealed to the public with big advertisements in Oregon newspapers. These ads informed the public of the economic and industrial value of highways and highway transportation. Not only did the ads help defeat the referendum but operators found that it greatly increased their business. One operator noted an increase of 22 per cent above normal.

And Particularly the Railroads

Speaking of social and economic changes, H. G. Wells, the famous British novelist, said, "In the case of the motor car we have let consequence after consequence take us by surprise."—G.T.H.

FLEET MEN MAKE PROGRESS IN THEIR WAR ON "GASSING"

A FEW OF THE FUME REMEDIES

Correct carburetor adjustment is greatest single factor in combating gas fumes.

Exhaust gas leakage can be prevented by dividing the exhaust line from manifold to tail pipe into flanged lengths, joining flanges with copper-asbestos gaskets and welding them to the pipe.

To keep fumes out of bodies with open rear ends carry tailpipe to point just forward of a rear wheel; agitation will do the rest.

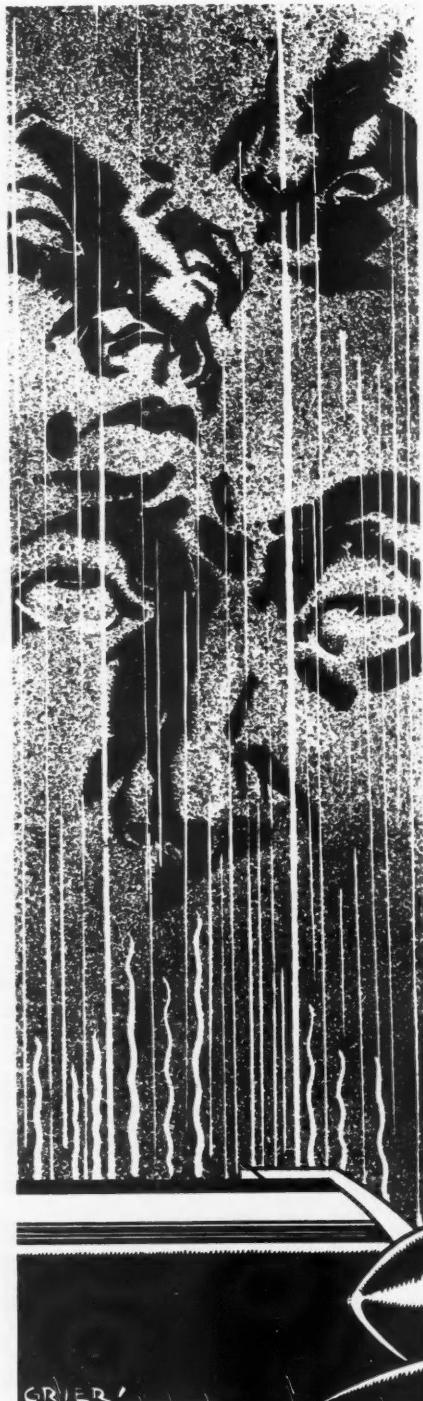
Ventilators at top of cowl will make cabs more bearable in hot weather.

CLEVER advertising writers have made smashing hits with campaigns dramatizing odors and the effects thereof. The term "B.O." has become current slang, the social consequences of halitosis are feared by multitudes and now the air conditioning rooters are demonstrating how many customers are lost to stuffy stores.

Meanwhile, but not consequently, odors of an unpleasant nature have been attracting attention in the motor vehicle field. No reasonable person expects a hard working truck engine to give off any fragrance but, alas, it appears that under certain conditions some engines produce aromas like a perfume factory running in reverse. In fact some critics go so far as to say that the engines stink. A small percentage of the hue and cry raisers are drivers whose opinions are respected but not feared but the majority are of the general motoring public whose opinions are not only respected but feared.

Maintenance men are expected to find a remedy and they have neither ignored nor shirked this responsibility. On the contrary, William J. Cumming, of the Surface Transportation Corp., New York, N. Y., who is chairman of the S.A.E. Subcommittee on Motor-coach and Motor-Truck Ventilation, explained what his company is doing to overcome the evil in the course of his report read at the Transportation Meeting of the S.A.E. in Toronto. Other fleet men present gave the results of their experience.

During the Toronto meeting Mr. Cumming did not confine himself to ventilation of cabs and bodies but he dug right down into the causes of gas fumes, including those discharged in the engine compartment and those coming out of the exhaust pipe, either along its length or from the tail pipe.



commonly known as "gassing." They are:

Leaking exhaust systems; leaking heating systems when direct exhaust heat is used (as in buses); imperfect crankcase ventilation; dirty and oily engines; collection of exhaust fumes under low body-skirts because of short tail pipes; poor engine carburetion; high vacuum in intake manifolds at low speeds; improper accelerator manipulation by the vehicle operator and poor engine maintenance.

Although a majority of these causes are properly within the jurisdiction of the maintenance department of a fleet, at least two are not. The two are crankcase ventilation and high intake manifold vacuum. Touching upon the first, Mr. Cumming observed that operators have been greatly annoyed by crankcase fumes and that it has been practically impossible for the operators to build an efficient system into existing engines for carrying off crankcase fumes. He passed the problem over to the manufacturers who have been, in his opinion, "backward in the development of efficient crankcase-ventilating systems."

The high intake manifold vacuum existing when a vehicle is drifting to a stop or going downhill with throttle closed causes abnormal combustion in the cylinders and "results in excessive fumes." This, too, is beyond routine maintenance procedure. Mr. Cumming reported that automatic valves which admit air to the manifold to reduce the high vacuum have been helpful in eliminating trouble from this source.

Within the field of maintenance Mr. Cumming and others reported that much was being done to control gassing. The obvious remedy of correct carburetor adjustment was the greatest single factor in combating gas fumes, according to the committee report.

Leakage of exhaust gas anywhere causes trouble. The committee report shows that dividing the exhaust line from manifold to tail pipe into standard flanged lengths with flanges welded to the pipe and joined by copper-asbestos gaskets was effective in preventing leaks. More than one operator reported that keeping after the exhaust leaks was the price of satisfaction.

T. C. Smith, American Tel. & Tel. Co., New York, advocated greater attention to ventilation of truck cabs. He pointed out that the volume of air

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DIESELS EAT UP DISTANCE ON COAST AND CRACK COSTS

By JOSEPH GESCHELIN

OUT in sunkist California trucking is a serious business. In the glamor of the wide open spaces, distance becomes a relative thing, measured in hundreds of miles while grades less than a mile high are just anthills.

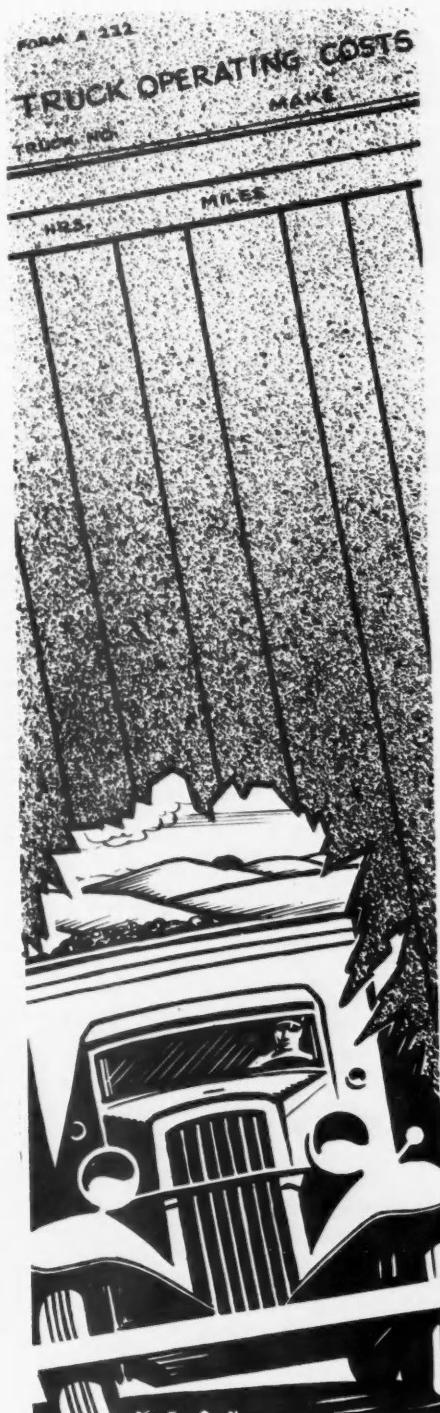
Where close to 900 cities are without rail connections, fast, dependable, low-cost truck transportation becomes a vital necessity. That's why on a recent trip to the Pacific Coast the writer jumped eagerly at an invitation to study the operation of Purity Stores, Ltd., of San Francisco, with a large number of stores dotting the State of California in a radius of almost 400 miles.

Of course the real interest lay in the fact that this organization has placed on the road the nucleus of a large Cummins Diesel operation which at the moment is the most significant on the American continent.

The daily records of this fleet proving that its Diesel-powered trucks hauling trailers, a total of 34 tons gross, are making more than 6 miles to the gallon of fuel oil costing only 3 cents per gallon on contract. Some of the routes entail a round trip of 700 miles, one route includes an upgrade 60 miles long.

J. E. Raymond, operating manager of this company, not only made available for inspection the home office records but encouraged a cross-examination of his drivers and mechanics. Diesel engines have wrought magic here. Where their introduction was viewed with scepticism, the drivers now look to driving a Diesel truck as a promotion. These men said that the new powerplant makes the route quicker, with less gear changing, less effort on the part of the driver, and with more assurance. Once shifted to a Diesel job, the driver if put back on the original gasoline equipment would consider himself disciplined.

At the present writing, Purity Stores has four trucks equipped with Cummins Diesels, in place of standard gasoline engines. One Diesel is the four-cylinder model; the other three have the model H, six-cylinder engine delivering 125 hp. at 1800 r.p.m. For comparison, it is said the gasoline engines develop about 97 hp. and weigh only 100 lb. less than the Cummins.



Although the Diesel engines have been in service but a short time they have built up an enviable performance record. Consider the figures given in the table. Cumulative totals are shown for each of the four Diesel trucks and for three of the regular gasoline jobs which cover the same

A SUMMARY OF THE FACTS

The Fleet Operator: Purity Stores, Ltd., of San Francisco.

Operates four Cummins Diesel-powered trucks hauling trailers. Gross load 34 tons per unit. Fuel consumption from 6.5 to 7.2 miles per gallon. This is practically double the fuel consumed by gasoline-engined units hauling same loads same routes.

On mountain routes Diesel trucks cut running time sufficiently to permit addition of one extra trip per month.

Fuel saving per Diesel truck per year expected to exceed \$1800.

routes with the same type of vehicle load and gross weight.

The four-cylinder job with full trailer weighs on the average about 50,000 lb. gross, generally the maximum that the law allows. Over a period of about 17,000 miles it has averaged 10 miles to the gallon of fuel oil, and an average of 250 ton-miles per gallon.

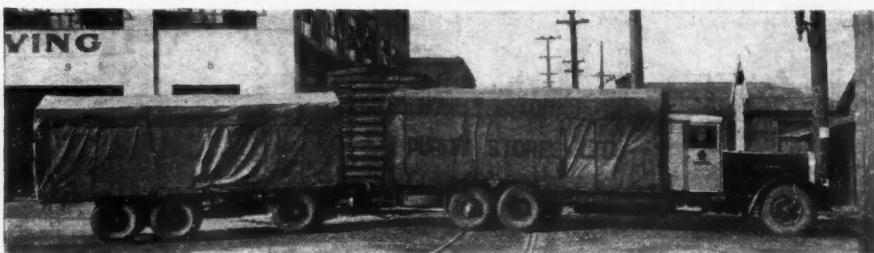
The three 6-cylinder Diesel vehicles over a total of 70,000 miles of operation averaged better than six miles per gallon of fuel oil for a ton-mile figure of 221-246 per gallon.

This compares with the performance of the three gasoline vehicles going over the same routes and doing the same work. Records for 80,000 miles show an average of a little better than 3.5 miles per gallon of gasoline or 121-130 ton miles per gallon.

Without bringing in the element of fuel cost it is seen that the economy of the Diesel on this operation on a mileage basis is in the ratio 6.8:3.5 or practically twice as many miles to the gallon of fuel. Thus with the same size fuel tanks the Diesel job will go practically twice as far. Or on a shorter trip, you can take on less fuel and exchange fuel weight for precious payload without incurring the displeasure of the state authorities armed with weighing scales.

If you consider fuel cost per mile, the economy becomes still more startling. This company buys gasoline on contract for 14 cents per gallon, tax included. Fuel oil without tax is 3 cents per gallon on contract. Interestingly enough, they pay a fuel tax of 3 cents per gallon on fuel oil just as a matter of principle so that their accounting takes in everything.

On this basis, the gasoline truck



Diesel-powered train leaving on 300-mile trip with 34 tons gross load.

costs about 4 cents a mile for fuel, while the Diesel takes 0.88 of a cent. Since one of these trucks makes about 5000 miles per month, the cost of gasoline is \$200 per truck per month; the cost of fuel oil, however, is only \$44 per truck per month. In one year, on this basis one Diesel may save (200-44) x 12 or \$1,872 on fuel alone.

No stunt is involved. Purity Stores primarily is interested in fast, sure transportation. Trucks travel as fast as the law allows, usually 30-35 m.p.h., and not at any low speed that might result in better fuel and oil consumption.

As a matter of interest, it might be mentioned that the fuel oil used on this operation is 27 plus, API gravity and is a readily available commercial product on the Coast.

What about maintenance? This inquiry was made because Diesel maintenance is a moot question in the minds of many people everywhere. Maintenance is no problem, at least within this fleet's experience. There are no carbon and valve jobs to think about. But what of the injection system? All it seems to require is a regular inspection about once a month or every 3000 miles when individual injectors are removed, inspected and adjusted. This job takes 2 hours.

Truck No. 121 which has gone about 40,000 miles is scheduled for an overhauling and when the engine is taken down they probably will replace pistons as a matter of course. On gasoline engines their practice is to replace pistons at 40,000-50,000 miles; valve and carbon jobs at 30,000 miles.

Maintenance is handled by their own mechanics who have found no particular difficulty in mastering the principle of operation of the new power plant. In fact the foreman of the department declared that it presented no problems differing from those within the experience of a good automobile mechanic.

Another thing that appeals to both

drivers and mechanics is the cleanliness of the Cummins Diesel engine. The joints are so well made up that there seems to be no oil leakage anywhere. Just a little background will show the importance of this.

Purity Stores makes the driver an important person. Each truck is assigned to one man. It has a big nameplate on each side of the cab with the name of the operator on it. To foster the personal appeal, cabs and hoods are made of aluminum, unpainted, which are kept clean and polished by the individual driver. It all tends to give the man a sense of personal interest.

It's easy to see how a clean engine appeals under the circumstances. It may be a small thing, aside from the saving in oil that it implies, but to the driver it means another detail that's taken care of without labor in preserving the spick and span appearance of a place in which he spends a lot of time.

The thermal efficiency of a Diesel engine shows up in a very practical fashion under operating conditions. When traveling the northern route, as to Yreka on the Oregon border, and elsewhere in the mountains, there comes the problem of keeping the engine warm rather than the usual need for adequate cooling. In all probability, if the engine were provided with a thermostatically controlled fan, the latter would be inactive most of the time. The radiator is fitted with a substantial window shade arrangement manually operated from the drivers' cab. This is closed off at will and, in conjunction with the thermostat, keeps the engine at a comfortable temperature.

With the greater lugging ability of the Diesel as pointed out in other discussions of the subject, the Diesel-equipped trucks not only require less gear shifting but run consistently at least one step higher on the transmission. This has a great appeal to the

drivers on these routes since it permits them to concentrate their attention on the road, thereby eliminating another source of fatigue.

Favorable driver reaction as well as the remarkable economy achieved on the four trucks already in operation has made Purity Stores decidedly Diesel-minded.

It is estimated that on the mountainous routes, the Diesel-equipped trucks gain sufficient time due to better performance in high gear, to add an extra trip per month on the average.

Fleet Men Make Progress In Their War on "Gassing"

CONTINUED FROM PAGE 18

in a cab is relatively small and that it is so near the engine that conditions are almost unbearable in the summer time. He advocated introducing fresh air into the dead-air space at the front and bottom of the cab by means of ventilators at the top of the cowl, rather than by admitting air over the top of the windshield.

J. M. Orr, Equitable Auto Co., was another advocate of cab and body ventilation. He suggested air openings at the front with means of increasing or decreasing the amount of air admitted but not to stop it altogether. He reported trouble with fumes being drawn into bodies having open rear ends and tarpaulin covers. This was overcome by carrying the tail pipe to a point just forward of a rear wheel, the violent agitation around the wheel scattering the exhaust gases.

The discharge from the end of the exhaust pipe when a driver takes his foot off the accelerator to drift to a stop or coast, in gear, down a hill frequently offends riders in trailing automobiles. M. G. McGorum, Montreal Tramways Co., described the discharge as a "cloud of acrid, sickening white smoke which rolls out of the exhaust during deceleration."

The cause of this offensive charge is the distorted combustion which takes place when the throttle is closed and vehicle momentum is dragging the engine around at more than idling speed. What takes place in the cylinders under these conditions is something which neither Beau de Rochas nor Dr. Otto intended when they were developing and applying the four-stroke cycle. What happens is something which no one would bring about intentionally and something which fleet men would do a lot to prevent.

During part of the cycle gas (used here in the broad sense) moves out of the combustion chamber into the intake manifold and later in the cycle gas moves into the cylinder from the exhaust manifold. Meanwhile there is high vacuum in the cylinder which tends to draw an excess of lubricating oil into the combustion space. Is it any wonder that tinkering with the idling air valve adjustment does not

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Comparative Fuel Consumption Figures of Diesel and Gasoline Trucks

Truck No.	Description	Aver. Gross Load (lb.)	Total Miles Run	Fuel Used (Gal.)	Aver. M.P.G. Fuel	Aver. Ton Miles Per Gal. Fuel
108	4 cyl. Diesel	50,000	16,838	1,685	10.0	250
109	6 cyl. Diesel	68,000	24,174	3,704	6.5	221
123	6 cyl. Diesel	68,000	7,053	973	7.2	246
121	6 cyl. Diesel	68,000	38,806	5,849	6.6	224
110	6 cyl. gasoline	68,000	26,598	7,465	3.56	121
111	6 cyl. gasoline	68,000	28,738	7,528	3.8	130
112	6 cyl. gasoline	68,000	29,235	8,223	3.55	121



Walter Fishleigh, consulting engineer, Detroit: "What engineer dares say that gasoline is the proper fuel or even that the Otto cycle is the proper operating cycle?"



Athel F. Denham, field editor, Commercial Car Journal: "Better riding qualities, including roadability, cannot be obtained merely by substituting new super-balloons for present equipment."



T. R. Dahl, vice-president, The White Co.: "In our legislative battle we can't stop at the establishment of economic premises. We must go beyond and get the public interest."



Max Hofmann, Diesel engineer, Waukesha Motor Co.: "The time has come when Diesel designers and fuel producers must cooperate to produce a standard rating for oil engine fuels."

ENGINEERS TURN THOUGHTS TO RADICAL AUTOMOTIVE IDEAS

WHETHER the story of the annual meeting of the Society of Automotive Engineers, held in Detroit last month, should be told in a separate article or included in the Ear-to-the-Ground Department column is a question. If one-half of the ideas expressed at the meeting are carried out in the near future, the latter classification wins.

Engineers talked of two-cycle engines, streamlined cars giving 50 miles to the gallon of gasoline, spring suspensions which will not throw a passenger off the seat under any conditions, flexible non-shatterable "glass" for windshields and windows, automatic clutches and self-shifting transmissions. Surprising, indeed, was the fact that in most cases they predicted these developments for the immediate future if buyers wanted them.

In general the progressives were in the majority and they challenged present-day design in general and in particular. Another challenge to engineering design, that of legislation, engaged the attention of the transportation and maintenance session, but that is a different story.

In contrast with the general air of big-changes-just-around-the-corner which prevailed during the meeting Athel F. Denham, field editor for COMMERCIAL CAR JOURNAL and other Chilton publications, revealed that

THEY TALK CASUALLY OF—

- ¶ Streamlined vehicles giving 50 miles to the gallon of gasoline.
- ¶ Two-cycle gasoline engines.
- ¶ Automatic clutches and self-shifting transmissions.
- ¶ Flexible non-shatterable "glass" for windshields and windows.
- ¶ Spring suspension that gives the riding comfort of your favorite easy chair.

passenger car engineers are not yet ready to accept the extreme low-pressure tire (an 8.25 section is the largest being considered) and that for the immediate future "ballooning" will be restricted to a single oversize for vehicles weighing more than 4000 lb. Which, obviously, leaves trucks out of it, for the present. Mr. Denham reported that the consensus of opinion of automobile manufacturers and tire makers, whom he contacted, favored a limit of a triple oversize for vehicles weighing up to 3000 lb., a double or

triple oversize for vehicles between 3000 and 3500 lb.; a double oversize for 3500 lb. to 4000 lb., and a single oversize or a six-ply modification, with no smaller wheels, for vehicles weighing more than 4000 lb.

Camber, caster, toe-in, steering and brakes must all be considered in changing from balloons to doughnut tires. "Recent experience has definitely indicated that better overall riding qualities, by which term I include roadability, cannot be obtained by merely substituting the new tires for present equipment. A gain in one direction is likely to be offset by losses in others," according to Mr. Denham.

Truck men are interested in any development which makes gear shifting easier, because they have more gear shifting to do and also because improper shifting costs them money. If a driver hangs on in high on a grade too long he loses time and strains the engine, and if he climbs in first gear instead of second he wastes fuel and time and increases wear. On the other hand, one engineer condemned passenger car drivers who were "too shiftless to shift" four-speed transmissions.

The outlook for automatic transmissions is hopeful, according to Walter C. Keys, consulting engineer. He said, "There is much activity at

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SAVING PENNIES IS O.K. BUT DON'T PASS UP THE DOLLARS



A WORD TO OPERATORS WHO SEEK WAYS OF CUTTING COSTS

The matter of greatest importance is to determine whether you have the right number of the right size and type of trucks. Much greater yearly savings in delivery cost will usually follow the finding of ways to cut down the number of trucks really needed.

Fewer trucks mean lower cost for that big item—driver's wages—as well as less total money for depreciation, taxes, insurance, license fees, etc.

By R. W. KNOWLES

Transportation Engineer, The White Co.

Sets of rules and books of charts, tables, etc., might be some help. But just as you call on a dentist, doctor, lawyer or architect—i.e. a specialist—the best results will come from obtaining the services of an automotive transportation engineer. Backed by varied experience in other sections of the country and in other lines, he would go over the routes, investigate loading and delivery conditions, observe present speeds and possibilities, learn how repairs are handled, etc.

Average costs—as such—are almost certain to prove misleading, because every delivery or transportation problem is made up of many parts, i.e., comprises a number of variables, and probably no two problems have exactly the same make-up. Hence, each component part must only be compared, with a similar part in another operation, if such a one can be found.

What product is being hauled? Does it require a high first cost body or other equipment? Is the operation wholly or partly on paved city streets, or on unimproved roads, with plenty of traffic congestion or without? Are trucks really *maintained* to a high "standard of excellence," or just "fixed" enough to run? Is the daily mileage per truck (including spare and "in shop" trucks), high or low? Are there many "stops per day" with engine left running, or few stops with engine shut down? Are trucks under-tired, or overloaded, or run faster than they should be? Does the "repair shop" fix passenger cars—but charge the men's time to trucks? Have you kept your trucks too long—in relation to their first cost, and original quality? Do you spend money on re-

for depreciation, taxes, insurance, license fees, etc.

The delivery ability of a fleet of trucks involves at least four phases; (a) Time used—or lost—at the loading point; (b) Speed capabilities of the trucks themselves, i.e., time required to travel to the various delivery points; (c) Time spent (or wasted) at the delivery points; (d) The way they are routed to take advantage of short cuts, avoid hills, poor roads, combine deliveries, reduce returned merchandise, increase deliveries per driver, etc.

Have you the right number of trucks for the amount of, say, parcels you deliver per week? Do you keep two spares to run 13 regularly? By rerouting and speedier loading could you do the same work with one spare and 10 regulars? Each one of the 10 trucks might have to run more miles, but *total fleet miles* would be less, and there would be less *over-all* cost. "Correct," you say, "that is exactly what we are trying to find out."

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EVERY business man is searching for ways to cut his costs, and since delivery takes 15 cents to 30 cents out of every dollar of revenue, it is perfectly natural to ask "What should it cost me—per mile—to run my trucks? I want an *average* cost to check up my operation." Low "per-mile" costs, for repairs and depreciation, etc., can be had, if the trucks are correct in size for the load they are to carry, and the operating conditions; and if the trucks are repaired by skilled men who have proper facilities for doing the repair work.

But the matter of far greater importance is to determine whether you have the right number, of the right size and type, of trucks. The old adage, "time is money," is especially true in truck delivery, and much greater yearly savings in delivery cost will usually follow the finding of ways to cut down the number of trucks really needed. Fewer trucks mean lower cost for that big item—driver's wages—as well as less total money



"K" FACTOR EASES FIGURING OF SPEEDS AND GEAR RATIOS

A BOON TO TRANSPORTATION ENGINEERS AND EXECUTIVES

The new "K" factor is a figure based upon the revolutions per minute of a given tire running under load at one mile per hour. It is based upon rolling radius and eliminates the radius ("r") and the factor "168" from the speed and ratio formulas.

Although based upon a uniform rolling radius for each size of tire under load its use is acceptable to factory engineers.

Table of "K" factors is on the next page.

By JAMES W. COTTRELL

Technical Editor, Commercial Car Journal

THE formula for calculating speed of a truck in miles per hour which was given in the article in the January issue is:

$$\text{MPH} = \frac{\text{RPM} \times 60 \times 2\pi r}{5280 \times 12 \times R}$$

and by multiplying and dividing as indicated this becomes

$$\text{MPH} = \frac{\text{RPM} \times r}{168 \times R}$$

In this formula, R is the rear axle reduction, or the total reduction if in gear, and r is the rolling radius of the driving tire.

This second formula can be still further simplified by using a "K" factor which is a figure based upon the revolutions per minute of a given tire running under load at one mile per hour. It is based upon rolling radius and it eliminates the radius "r" and the factor 168 from the formula. Speed of the vehicle then becomes:

$$\text{MPH} = \frac{\text{RPM}}{K \times R}$$

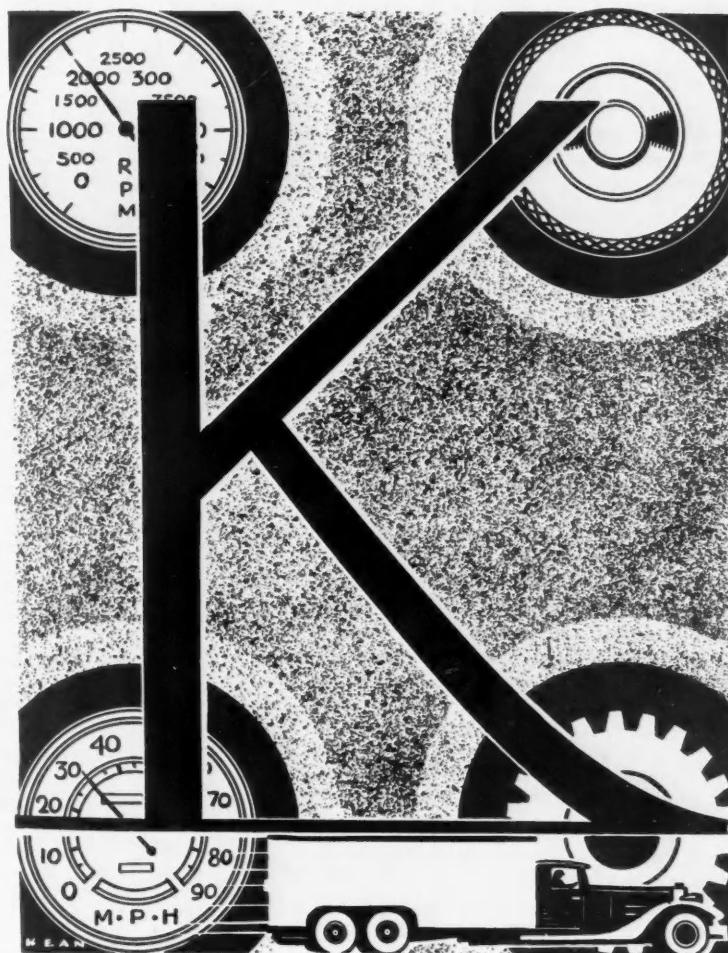
The K factors given in the accompanying table and the formula were furnished through the courtesy of M. C. Horine, of the Mack company, a member of the S.A.E. truck rating committee and S.A.E. vice-president representing motor truck and motor coach engineering.

Because the K factor is based upon rolling radius of the tire under load its use may perhaps be criticized for the reason that the rolling radius of different makes of tires differ. A thicker tread on the same size tire

carcass gives a longer rolling radius than a thinner tread.

However the variations between dimensions of tires are not large enough to make useless calculations based upon the assumption that the rolling radius of various makes of tires of the same size are identical. A prominent factory engineer pointed out that speed need not be calculated to a fraction of a mile per hour. He said "Giving a speed as, say, 39 or 40 miles per hour is near enough; therefore we can disregard the slight variation in tire size. There is a difference between a worn and a new tire and there is some slip on any tire." In addition he observed that speed of engines under governor control may change of the order of 100 to 200 r.p.m.

There is still another reason why average figures for rolling radius may be used in the formulas for engine speed, vehicle speed and gear ratios. No tire, either solid or pneumatic, maintains perfect contact with the



road at all times. There is a certain amount of slippage of the driving tires and when the tire is momentarily in the air after striking an obstruction the tire frequently spins a little, especially if the tire on the other wheel is in full contact with the ground.

The Tire and Rim Association allows 2 per cent for the difference between theoretical and actual number of revolutions per mile for a tire. The association formula is:

$$\text{Rev. per mi. of tire} = \frac{5280 \times 12}{2 \times 3.1416 \times \text{rolling radius}} \times .98$$

Taking all of these uncontrollable variables into consideration there seems to be justification for the use of a uniform rolling radius for a given tire size, and therefore, for the use of a K factor. Its use certainly makes it easy to figure engine speed, vehicle speed or gear ratios.

For example, what is the speed in

miles per hour of a truck carrying 6.00/20 rear tires, with 6.5 rear axle ratio when engine is running at governed speed of 2500 r.p.m.?

Looking in the table we find that the K factor for a 6.00/20 tire is 10.88. Speed therefore is equal to 2500 divided by 10.88 multiplied by 6.5. The answer is 35.3 m.p.h.

The K factor can also be used in the formula for gear ratio. As given last month the formula is

$$R = \frac{RPM \times r}{MPH \times 168}$$

and introducing the K factor instead of the rolling radius and the figure 168 we have

$$R = \frac{RPM}{MPH \times K}$$

Substituting the figures from the assumed case we have: gear ratio equals 2500 divided by 35.3 times 10.88 which equals 6.5.

If trucks ran around on steel-tired wheels or on solid metal wheels like locomotives and farm tractors the term "rolling radius" would be of no more use in the truck field than "please" to a mule driver. But trucks are not running around on rigid wheels but on pneumatic tires.

The more cushioning effect there is to a tire the more it deflects under load. What happens when a load is put on a balloon tire is that the tire deflects or bends and both the length and width of the part of the tire in contact with the ground increase until it is enough to support the load. The side walls of the tire have a certain amount of load-carrying ability but in general the ground contact area is in proportion to the load and inflation pressure.

This deflection of the tire changes the effective radius of the tire. If we have a rigid tire 32 in. in diameter the distance from the center of the axle to the point of contact with the ground would be exactly 16 in. And in figuring torque and pulling power we assume that the power is applied at a point 16 in. from the center of the axle. But when the tire deflects the lower radius changes by the amount of the deflection. The lower radius, that is, the distance from the center of the axle to the ground directly beneath, is called the rolling radius and it is used in calculating pulling ability as well as engine and vehicle speed.

If we have a tire measuring 32 in. in diameter jacked off the ground the radius is 16 in. Lowering it to the ground may deflect it, with a given load, 1 in. and in this case the rolling radius is not 16 in. but 15 in. and it is considered the same as a 30-in. tire. In all of these cases we are considering the tire diameter only.

One-half the outer diameter given in the last column of the accompanying table of K factors is, of course, the actual radius of the tire. The loaded, or rolling, radius under the specified load is given in the center

TABLE OF "K" FACTORS

TIRE SIZE	LOAD	LOADED RADIUS	K	OUTER DIA.
<u>BALLOON</u>				
5.50-20	1225	15.19	11.06	32.1
6.00-20	1400	15.42	10.88	32.6
6.50-20	1650	15.98	10.50	33.8
7.00-20	1900	16.49	10.18	35.0
7.50-20	2100	16.90	9.94	35.8
22	2250			
24	2400	18.54	8.91	39.9
8.25-20	2550	17.70	9.48	37.3
22	2800	18.72	8.97	39.4
24	2950	19.64	8.55	41.4
9.00-20	3250	18.20	9.23	38.9
22	3500	19.16	8.77	40.9
24	3650	20.12	8.35	42.9
9.75-20	3900	18.87	8.90	40.2
22	4200	19.84	8.46	42.1
24	4400	20.82	8.07	44.2
10.50-20	4700	19.55	8.59	41.4
22	5000	20.50	8.20	43.5
24	5200	21.44	7.83	45.6
11.25-20	5450	20.23	8.29	43.1
22	5800	21.07	7.97	45.1
24	6050	22.13	7.59	47.1
12.00-20	6250	21.21	7.91	44.9
22	6700			
24	6950	22.95	7.32	48.8
12.75-20	7200	21.63	7.75	46.2
22	7700			
24	8000	23.57	7.13	50.3
13.50-20	8200	22.11	7.59	47.3
22	8800			
24	9100	24.17	6.95	51.3
<u>HIGH PRESSURE</u>				
30x 5-6	1575	15.25	11.00	32.2
30x 5-8	1700	15.71	10.68	32.5
34x 5	1950	17.70	9.48	36.6
32x 6-8	1950	16.02	10.48	33.4
32x 6-10	2200	16.72	10.02	34.5
36x 6	2500	18.70	8.97	38.6
34x 7	2800	17.76	9.45	36.6
38x 7	3200	19.67	8.54	40.6
36x 8	3600	18.70	8.97	38.6
40x 8	4000	20.71	8.10	42.7
38x 9	4500	19.88	8.45	41.2
42x 9	5000	21.86	7.68	45.3
40x10	5500	21.17	7.94	43.9
44x10	6000	23.14	7.25	48.0
<u>SOLID</u>				
32x 4	1800	15.3	11.0	32.4
34x 4	1900	16.3	10.3	34.4
36x 4	1900	17.3	9.7	36.4
32x 5	2700	15.6	10.7	33.2
34x 5	2850	16.6	10.1	35.2
36x 5	2650	17.6	9.5	37.2
40x 5	3000	19.6	8.1	41.2
34x 6	3800	16.7	10.1	35.4
36x 6	3800	17.7	9.5	37.4
40x 6	4000	19.7	8.5	41.4
34x 7	4750	16.8	10.0	35.7
36x 7	4750	17.8	9.5	37.7
40x 7	5000	19.8	8.5	41.7
34x 8	5700	16.9	10.0	35.9
36x 8	5700	17.9	9.4	37.9
40x 8	6000	19.9	8.4	41.9
36x10	7600	17.9	9.4	37.9
40x10	8000	19.9	8.4	41.9
36x12	9500	17.9	9.4	37.9
40x12	10000	19.9	8.4	41.9
36x14	11400	17.9	9.4	37.9
40x14	12000	19.9	8.4	41.9
40x16	14000	20.6	8.1	43.4

column. Because of greater deflection under load the loaded radius of balloon tires is proportionately less than high pressure tires and all are less than the true radius.

Saving Pennies is O.K. But Don't Pass Up the Dollars

CONTINUED FROM PAGE 22

pairs to old trucks, that will have little earning value when repaired? Are drivers delayed in loading, with the result that they "speed" to get home? Do you segregate "accident" repair costs from the balance?

Unless all of these items, and several more, are the same in your delivery as in some other, you should not use average costs, nor compare your costs, per mile, or package, or per ton, with any other firms.

A large eastern store has 31 one-ton trucks. At the time the following figures were obtained, 11 were one year old, 10 were two years old, four were three years old and five were four years old. The fleet operated 401,365 miles in one year for \$39,518.21, an average of 98.6 cents per truck-mile for gasoline, oil, tires and repairs. The one-year-old trucks showed 8.33 cents per truck mile, the two-year-olds 2 cents per mile more, the three-year-olds 1 cent still higher, the four-year-olds averaged between the one and two-year-old trucks.

A Chicago fleet had 36 one-ton trucks averaging 13,140 miles each. Gasoline, lubrication, "general expense," tires, repair parts and labor totaled \$37,311.07, an average of 7.88 cents per truck mile. A middle-west store operated 30 trucks, five to eight years old, which averaged 12,906 miles for the year, cost 8.12 cents per mile for gasoline, oil, tires and repairs, of which 1.25 cents was for tires. During the same year a far-west baking company operated six of the same model trucks 10,782 miles per truck per year, with the above items costing 6.85 cents.

It might seem that any of these costs could be used to check another fleet, but the difference between the last two—at 1.27 cents per mile—multiplied by the 401,365 miles of the first fleet is \$5,173 a year. This \$5.173 is due to, and properly accounted for by, different operating conditions, wages, prices, etc.

The driver is probably the biggest single factor in delivery costs. A real good man may show variable costs (gasoline, oil, tires and repairs) 10 per cent or 15 per cent below his fleet average, while a poor driver may cost 15 per cent over the average, i.e., 30 per cent more than a good one, with the same identical truck. A driver may drive full speed close to where he knows he must stop for a delivery, a traffic light, etc., jam on his brakes, slip the tires, etc. He thinks he is gaining time, but actually he is costing his company more than any

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THE JOINT RAILROAD AND HIGHWAY USERS REPORT

◆ HAVING READ THE REPORT OF THE Joint Committee of Railroads and Highway Users at least three times we can safely say—without being accused of snap judgment—that these railroad men certainly have a way with them. They entered into conference with representatives of highway users for the purpose of compromising opposing views on the regulation and taxation of highway transportation. They came out of the conference, to judge by the report, with their record for not-giving-in-an-inch unblemished. It is no wonder that they are anxious to continue the conferences in order to "compromise" the remaining differences.

However, since the "remaining differences" include the vitally important matters of rate regulation and the lengths and weights of vehicles, it is to be hoped that the railroads will unbend and make some concessions. They must, if an agreement is to be reached, because it is to be expected that the highway representatives will not budge from their positions on both matters.

In the case of lengths and weights the highway users' position is supported by the expert views of the American Association of State Highway Officials and the Bureau of Public Roads. In the case of rate regulation their view that sufficient data have not been collected to indicate the desirability of such regulation in public interest, is supported by public opinion—the absence of which is indicative that the public is satisfied its interests are being served as matters now stand. This support will not be denied if public opinion is forced into expressing itself because it must be evident that the only interests which will be served by rate regulation are those of the railroads and of the certificated highway carriers who have grown large enough to feel that they ought to be protected from their competitors.

MAYBE THIS IS STRATEGY

◆ IT WILL BE PUZZLING TO EVERYONE who reads the joint report why the railroads refused to make a concession in the matter of lengths and weights. After agreeing to a 96-in. width and 12 ft. 6 in. height, they drew themselves up to the unbending position by declaring they were "unable to make any definite recommendations for uniform application" on weights and lengths because they believed these were "matters that should be left to the proper State regulatory authority, as they may find to be in the public interest." They could not even bring themselves to see eye to eye with such expert authorities as the U. S. Bureau of Public Roads and the American Association of State Highway Officials of whose entire code the Highway Users urged acceptance. (See page 64, December COMMERCIAL CAR JOURNAL.)

The report of the joint committee opens with a declaration of policy: "The public is entitled to the benefit of the

AFTER HOURS



QUOTE:

"Everybody, as a matter of selfish individual interest, is for a fair deal for the railroads. If they are patient, they will get it. But, as the ancient legal aphorism has it, the plaintiff must come into a court of equity with clean hands. The railroads have not yet done this."—St. Louis Post Dispatch.

AMEN!



most economical and efficient means of transportation by any instrumentalities of transportation which may be suited to such purpose, and no legislation should be enacted which has for its purpose the stifling of any legitimate form of transportation. The supreme test must always be the interest of the public. The public's right to the selection of the agency of transportation which it wants and which it finds most useful must be respected."

To what extent this "public right" is "respected" you may judge for yourself after reading the following resumé of the points on which the rail and highway groups agreed:

THE RECOMMENDATIONS

◆ COMMON CARRIERS OF PERSONS AND property in interstate commerce on highways should be under the jurisdiction of the Interstate Commerce Commission or other properly constituted Federal tribunal and should be required to obtain certificates of public convenience and necessity.

Consideration should be given, before such certificates are issued, to the effect the proposed service would have on existing transportation services, and the financial responsibility of the applicant should be considered.

Common carriers in intrastate commerce should be required to obtain certificates of necessity and convenience after the same considerations.

Contract carriers in both interstate and intrastate commerce should be required to obtain permits from the proper au-

thorities, and "make adequate provision as to financial responsibility."

(The conferees failed to get together on their interpretation of the term "permit." The railroad representatives maintained that a permit to operate was granted as a privilege. They quoted the Supreme Court as stating in the recent Binford case, "it is well established law that the highways of the state are public property; that their primary and preferred use is for private purposes; and that their use for purposes of gain is special and extraordinary, which, generally at least, the legislature may prohibit or condition as it sees fit." * * * The highway users accepted the definition of permit set down by the Interstate Commerce Commission that when a motor carrier has complied with provisions for the protection of the public, as recommended by the commission, he is then entitled to a permit.)

Private carriers of property who engage in transportation on highways of commodities not of their own production, for hire, should be required to secure a license from the proper authorities.

Requirements as to qualifications and hours of service for drivers as prescribed by the regulatory authority should be observed by all carriers.

All carriers should be required to observe regulations as to safety devices and measures, size, weight, speed and operation of motor vehicles.

In determining on the issuance of certificates to interstate and intrastate common carrier applicants, the regulatory authority should give proper consideration to the financial responsibility of the applicant, including adequate provision for surety or insurance, bond, or agreement, for protection of other users of highways, passengers, shippers and the general public.

IN FACT, THEY SHOULD PAY

◆ MOTOR VEHICLES SHOULD PAY THE ENTIRE cost of the State highway system. They should also pay a part of the cost of county or township highways and part of the cost of "arterial routes through cities."

The apportionment of special taxes among motor vehicles of various types should be based upon use of facilities required.

All motor vehicles should pay a gasoline tax; passenger automobiles should pay a registration fee graduated according to weight or horsepower; buses and other vehicles carrying passengers for hire, a registration fee based on mileage operated and graduated so that it will increase more than directly with weight.

Special taxes levied upon motor vehicles using highways should be devoted entirely to highway purposes.

States should enter into reciprocal agreements for issuance of special licenses for commercial vehicles to cover States other than the home State at equitable rates to be determined by the conditions which prevail.—G.T.H.

COAL TRUCKING SMOOTHERS



WHETHER or not truckers can make a profit from their mine-to-consumer coal operations depends on distance traveled, the possibility of a two-way payload, the highway conditions and grades, the type of equipment, wages and the various legal considerations involved.

I believe the maximum radius of economic trucking from mine to consumer is within 50 miles from the mine for average equipment and 75 miles for better than average equipment. The reason for this conclusion is the fact that railroad rates per ton of coal graduates downward with the distance hauled. For example, the rate from the mines to Reading, Pa., is \$1.63 for a 36-mile haul, while to Chestnut Hill, Phila., it is only \$2.20 per ton for an 86-mile haul—only 57 cents more for the additional 50 miles. Dealers' margins remain about the

same, \$2.50 to \$4.85 per net ton. (See accompanying chart of circular prices, independent mine prices, established coal dealer prices and trucker to consumer prices.) The longer the haul, the lower the rate both for truck and freight car, but the freight rate decreases more rapidly.

In the face of these facts thousands of mine-to-consumer truckers, operating between the anthracite mines in Pennsylvania to points in North New Jersey, an average one-way haul of 125 miles, are committing financial suicide by delivering coal at rates \$1 to \$2 less per ton than regular dealer prices. Few of the truckers carry payloads both ways, although occasionally one will pick up a load. The public carriers are on the alert for any violation of law relating to the hauling of general merchandise for hire and while they have no objection

to the trucking of coal (which they consider unprofitable), they see to it that the coal truckers do not have much opportunity to depart from their legal status as private carriers.

There is only one good highway between northern New Jersey and the Scranton coal fields. This highway, while it has no excessively steep grades, climbs over several rather high elevations, one as high as 2000 ft. above sea level. It is this highway that the majority of the trucks operated in mine-to-consumer service in this area travel. The investigation revealed that the majority are loaded to at least twice the capacity for which they were designed. There are no legal difficulties about this in New Jersey so long as the registration is for the actual gross weight. It is a common thing to see a 1½-ton truck carrying 4 tons of coal, or a 2-ton chassis carrying 6 tons. Several coal truckers who ignored the law in the matter of gross load have been assessed the minimum fine of \$100 and costs for "overloading of commercial vehicles beyond gross weight as shown in registration certificate."

Few coal truckers claim to carry insurance of any kind, nor does the New Jersey or Pennsylvania law require that they do. The New Jersey law, however, requires that operators of motor vehicles who have been involved in accidents resulting in more than \$100 worth of property damage, or resulting in personal injury or death, must file an insurance certificate showing that a policy has been issued with the maximum limit of \$5,000 for personal injury or death, for one person, or \$10,000 if more than one person; and property damage in the sum of at least \$1,000.

The coal truckers operating in this area work about 12 hours per day. They figure an average of 3½ hours to drive to the Scranton district when empty and 5½ hours to return when loaded. Loading at the mine takes from half an hour to 3½ hours. The investigator found trucks waiting 3½ hours at one mine which was not equipped with breaker machinery, but sized its coal entirely by screening. Then, too, it takes from 20 minutes to 45 minutes to deliver each load of coal into the consumer's cellar, after which many truckers go out and solicit more orders. The custom is to leave for the mines at night or in the small hours of the morning, so that deliveries can be made at times which are convenient for the consumers.

The investigator followed several empty coal trucks and found their speeds to be from 35 to 45 m.p.h. on

Haulers Who Ignore Costs

level stretches. Loaded trucks were making 30 to 40 m.p.h. on the level stretches. How long light trucks with 100 per cent to 200 per cent overload can stand up at this rate is problematic. Several authorities expressed their opinion that 50,000 miles would end the useful life of such trucks, while others, more optimistic, estimated as high as 100,000 miles. The investigator believes that, with luck, a useful life of not more than 87,500 miles might be hoped for.

The coal truckers, most of them, make one round trip to the coal fields each day, including Sundays. Allowing 15 days off for repairs to the truck and rest for the driver, this would be 350 round trips of 250 miles, each, within a year, or a total of 87,500 miles per year, at which time the truck would probably be junk.

Several mine-to-consumer truck owners, questioned about how they figured their costs, answered that they figured the cost of gasoline, oil and tires at 2½ cents to 3 cents per mile, which, on a spread of \$4.50 per ton between cost and selling price of coal, left them a nice "profit" from the 250-mile round trip.

Their gross return per ton for each round trip of 250 miles is \$4.50, or an average gross income of \$.018 per ton per mile, of which 125 miles is traveled empty and 125 miles traveled loaded. Just how these coal truckers provide for depreciation, insurance, garage expense, office expense, interest on investment, selling costs, delivery costs, weighing costs, maintenance costs and repairs costs is a mystery.

Nevertheless, some coal truckers who had purchased light trucks for the sole purpose of hauling coal from the mines claimed that they were making enough to meet their payments on the trucks (on a 12-month lease contract basis), as well as a fair wage for themselves. One trucker who was hauling 4 tons on a 1½-ton truck which he was buying on time, could not understand what the investigator meant by asking what money was being set aside for the purchase of a new truck while the present truck was wearing out.

"I'm paying for this truck, ain't I?" he exclaimed. "I'll have it all paid for in less than a year. Why should I figure on paying for another truck, too?"

Still other truck owners, owning several trucks, are sending drivers to the coal fields when the trucks would otherwise be idle. Wages of these drivers range from \$4.00 to \$7.00 per 12-hour day, with about \$5.50 aver-

THOUSANDS OF MINE-TO-CONSUMER truckers operating between the Pennsylvania anthracite mines and northern New Jersey towns (an average one-way haul of 125 miles) are committing financial suicide by delivering coal at rates \$1 to \$2 less per ton than regular dealer prices.

The maximum radius of economic trucking from mine to consumer is within 50 miles from the mine for average equipment and 75 miles for better than average equipment.

For an established coal dealer with a string of large-tonnage customers whose requirements are less-than-carload lots, it should certainly pay to truck coal direct from the mines within the load and distance limits indicated. (See details in article.)

By SPENCER A. JONES

Special Investigator

age. One such truck owner told the investigator that he would rather "break even" hauling coal than have his trucks idle.

Finally one truck owner voiced what is probably the real reason for the long distance mine-to-consumer trucking activity.

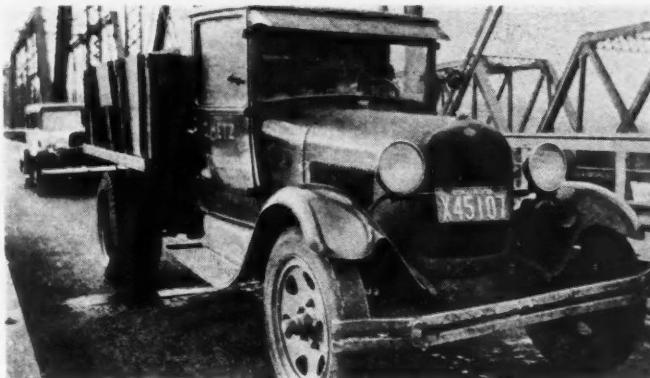
"I had this here truck," he said, "and the outfit I was hauling for

didn't have no more work for me. I couldn't find no work around town. I couldn't sell the truck for more than \$100. Then I heard there was a lot of jack in hauling coal, so that's what I'm doing. Maybe you're right. Maybe I am going broke. Maybe I am wearing out my truck fast. Maybe I can't buy another truck when this one is too shot to run any more. But just the same, I'm feeding the wife and the kids a lot longer by using this truck to haul coal than by trying to live on the \$100 I might be able to sell my truck for."

Local dealers in many towns have been seriously affected by mine-to-consumer competition, drops in volume of sales of as much as 45 per cent being reported by some retailers. Exactly how much of the drop in volume is due to truckers, and how much to other conditions is difficult to determine. Certainly the truckers seem to have no great difficulty in securing orders, since their prices are from \$1.00 to \$2.00 per ton below established retail prices.

Retail coal dealers are working more and more toward a cash basis of operation, charging additional prices for charge accounts. The general public, therefore, seems to feel

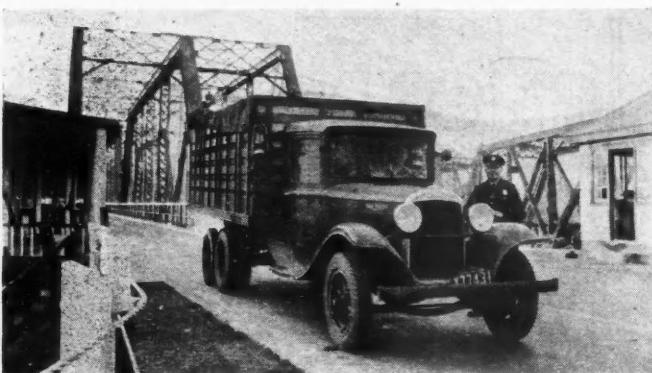
Truck hauling 4 tons of coal from Scranton, Pa., to Boonton, N.J., 110 miles. Coal is delivered into consumer's cellar. Pea coal bought for \$4.50 a ton sells delivered at \$9.00 a ton. Driver's wages \$5.00 per round trip. Speeds 35 to 45 m.p.h. empty and 25 to 35 loaded. Driver makes one round trip each day, including Sundays.



Comparative Coal Prices

	Prices at the Mines			Prices to the Consumers		
	Independent Mines	Circular Prices	Trucked in Credit	Dealer Prices	Cash	Credit
Egg	\$6.00	\$6.80	\$7.00	\$10.50	\$12.20	\$13.20
Stove	6.00	7.05	7.25	10.50	12.50	13.50
Nut	6.00	6.80	7.00	10.50	12.00	13.00
Pea	4.75	5.00	5.15	9.00	10.40	11.40
Buck	3.00	3.15	3.25	7.00	7.75	8.75

These prices at the mines and to the consumer are accurate within a few cents of present day prices and will vary only according to locality and usual market fluctuations. Circular prices are prices maintained by old line mine operators under mutual agreement and prevail for 80 per cent of the anthracite coal mined. The balance is mined by so-called independents at somewhat lower prices.



This truck was making a 130-mile haul with 6 tons of nut-size coal. Driver is paid \$6.00 for daily round trip of 260 miles. Driver said his boss carried complete insurance coverage.

that if cash is king, there is no obligation to purchase at other than the lowest cash price, and the lowest cash price is exactly what the truckers are offering.

The question is frequently asked: "Can an established coal dealer make a profit by trucking direct from the mines?" He cannot, in my opinion, if he maintains storage, elevating and other yard facilities because he must truck coal in direct competition with railroad freight rates, which is practically impossible. If, however, he is willing to scrap his yard equipment, local delivery trucks and be content with the use of public scales, I believe he can make a profit.

● The Coal Retailers' Problem

But the retailer would have to buy his coal at much less than circular prices in order to compete with the trucker who buys from independent mines.

For example, let's take a 250-mile round trip by a trucker with a difference of \$4.50 per net ton between independent buying and trucked-in selling price. To haul 22 tons (probably the largest allowable load) on truck and trailer would bring a gross return of \$99 for the 250-mile round trip. This is a gross return of \$0.396 per mile. A job of this kind can be operated and maintained as low as \$0.33 per mile, which leaves a net profit of 6.6 cents per mile, or a total of \$16.50. The delivery into the cellar is part of the driver's job and is figured in his wages.

Now take \$6.80 per ton as a circular purchase price and \$10.50 per ton as trucked-in sales price with a 22-ton load and a 250-mile trip. The gross return would be \$81.40 or \$0.326 per mile against an expense of \$0.33 per mile. This indicates the folly of a retailer attempting to make a go of trucking coal on the basis of buying at circular prices and selling at trucked-in prices.

Conversely, the retailer can't hope to maintain any such retail selling price as he has today, regardless of transportation methods, if mine-to-consumer truckers increase appreciably in numbers.

When studying comparative costs of trucking coal two factors must be borne in mind—first the tonnage to be carried; second, the distance traveled.

stant file of orders can be maintained. But I wouldn't recommend any retailer to tackle it for distances of more than 75 miles and then only with a 22-ton job. For an established dealer with a string of large tonnage customers, whose requirements are less than carload lots, it should certainly pay to truck coal direct from the mines within the load and distance limits indicated.

Servicing Can Be Halved by Design

CONTINUED FROM PAGE 14

for the so-called 1½-ton trucks were about the size of a real 5-ton job, I think we could use them about 50,000 miles before replacing.

Transmissions with four speeds including the very low speed—used for getting away from curbs in the winter when snow and ice cause the wheels without chains to spin in the usual low speed ratio—are fine as they are now, the shifting levers and forks, etc., could be made a little stronger, but are not serious as they are.

● A Few Words on Rear Ends

With Hotchkiss drive we will need two universal joints, which are always a source of trouble, so let's put our driveshaft in a torque tube with one universal well covered and lubricated by the transmission. Rear ends are very much better on the late models, but why do some engineers talk about a full-floating rear end and then put in two spider gears mounted on a straight pin that makes it impossible to drive out a broken shaft. As a user of motor trucks, I always supposed a full-floating rear end was to enable the removal of broken axle shafts (please don't assume that they won't break) in the quickest possible manner, so as not to hold a truck on the road any longer than necessary. Let's see the difference in service between a semi and a full-float (made right) at the time of a service call. With a semi-float axle the garage has to send out two trucks, one for the salesman to use to continue his delivery, and one to tow in the disabled truck. When back in the garage it has to be jacked up and the differential taken out to remove the broken axle. With a properly made full-float axle, that is, one with three or more spider gears so that the spider has a hole in it through which a broken axle can be driven out, all that the garage has to send is one man, one truck and the tools and axle. Moreover, the job can be done in less than 20 minutes after arriving. So, I guess we will want a three-spider full-float rear end in our truck.

On some full-floating rear ends, the wheels are mounted on two taper bearings and some on one large double row annular ball bearing—either is good, as I have used both and found no trouble.

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OVERLOADED TIRES

A typical example of badly overloaded tires. Note the sagging rear axle. Overloading causes premature tire failures and operators will pay for proper size tires whether used or not.



These fabric breaks are the direct result of excessive flexing and heat produced by overload or underinflation. Tires should be large enough for the load and mounted on proper size rims.

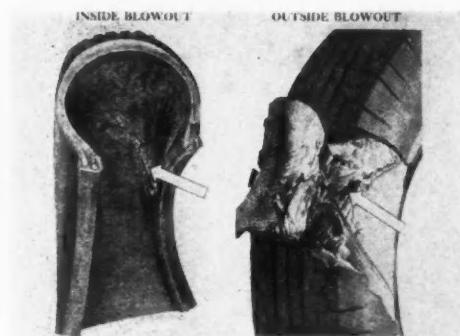


WEIGHING THE LOAD

Each size tire has a definite carrying capacity and only by weighing load per axle can proper size be determined. Truck operators cannot afford to guess at their tire requirements.

PREVENTIVE MEASURES THAT HELP STOP TIRE FAILURES

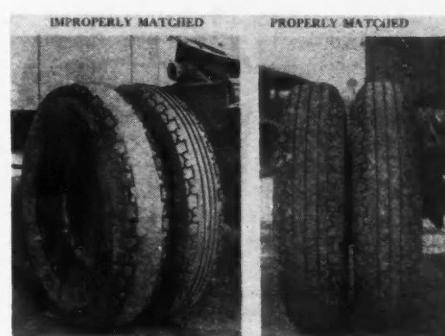
SPEED



These failures are brought about by sustained high speed or overload. Such operating conditions develop excessive heat and build up the air pressure. The heat weakens the tire while the increased pressure stretches the fabric so tightly that it cannot flex normally. The result is a large blowout.

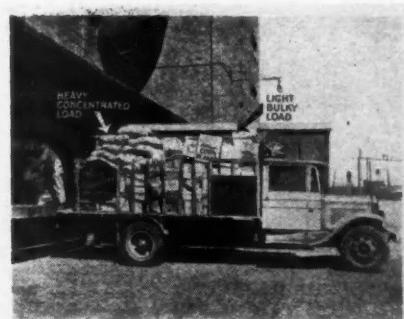
Helpful Suggestions to Truck Operators for Reducing Rubber Cost

DUALS



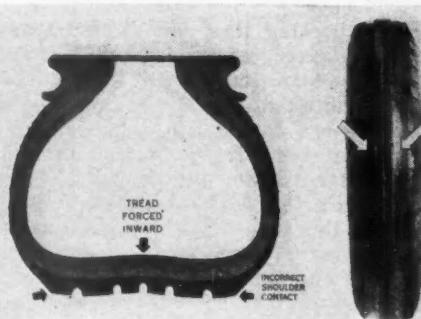
Worn tires are smaller in outside diameter than new tires and should never be placed on the outside of a dual wheel with a new tire on the inside. To do so overloads the new tire. The more worn tire should always be placed on the inside. Unequal inflation will bring about the same result as improper matching.

LOAD DISTRIBUTION



Heavy materials should always be placed in front of the truck. This gives better distribution of weight, both front and rear and minimizes the danger of premature failure of the rear tires.

UNEVEN TREAD WEAR



On the underinflated or overloaded tire the shoulders are subjected to a wiping motion and at each revolution of the wheel scuff off the tread rubber at the shoulders of the tire. See worn tire at right.

SPRUNG AXLES



When truck equipped with dual tires is used on crowned roads or sufficient load is carried to spring the axle most of the weight is thrown on inside tire. This causes inside shoulder wiping and breaks fabric.

TURN TO PAGE 36, PLEASE

VISCOOSITY DECIDES OIL DRAIN PERIODS

AVITAL question which confronts fleet owners is deciding when to drain oil from truck engines to insure complete lubrication under all working conditions without wasting oil.

To answer this question, it is necessary to find out the factors which insure complete lubrication, and the second step is to drain oil at intervals which will maintain lubrication on that basis. In particular, it is necessary to find out the characteristics of an oil which will satisfactorily lubricate an engine and to drain the oil at intervals which will keep it within the limits of characteristics necessary for lubrication.

Oil in the engine crankcase is what lubricates an engine, not the oil as it is poured into the crankcase. In two previous articles it was shown that oil undergoes changes after it is poured in the crankcase because of the condition of the engine or because the oil itself changes. It seems logical, therefore, to check the oil in the crankcase at a drain period, or a proposed drain period, to determine if the oil should be drained or not.

Results of more than 1000 tests in fleet operation, which are shown in the chart, show clearly that maintaining viscosity between S.A.E. 10 and S.A.E. 35 gives the highest degree of engine lubrication. It follows, therefore, that the drain period should be established at intervals which will keep the oil within these two limits. The manner of determining the interval will be treated later in this article after we have shown why the limits of S.A.E. 10 and S.A.E. 35 suggested themselves.

There is no satisfactory laboratory test for the lubricating quality of an oil, and while seeking a measure of this lubricating value, it occurred to me that the cost of engine repair could be used as a standard. Except for breakage, wear of engine parts depends largely upon friction, therefore it is in proportion to the ability of an oil to reduce friction.

For comparison of engine repair costs, we must have some measure of the amount of work done by the engine, as it would not be fair to com-

pare costs of maintaining one engine with another which had done twice as much work. The commonly-used mileage figure has many disadvantages because operating conditions are different and one mile is not at all like another mile. Producing power from a gallon of gasoline is a better basis for engine performance because it takes into account some of these variations.

In checking fleet operations, I secured figures showing engine repair costs and the cost of gasoline used and compared the two figures. To illustrate, I found in one fleet operation that the total cost of engine repairs, for a given period, was \$463.18 and that the cost of gasoline used during this time was \$716, based upon a price of 17 cents per gallon. This figures out that engine repairs cost 64.7 per cent of the cost of gasoline, and tests of the average viscosity of crankcase oil gave the equivalent of S.A.E. 58, according to the values shown in the chart.

Although there were many factors which interfered with the accumulation of data in some fleet operations, on a whole the results were fairly uniform. All cost figures were taken right from the fleet owners' records.

Variations in test points shown in the table were due to different qualities of gasoline being used, differences in the cost of labor and material and lack of uniformity between fleets in shop efficiency and mechanical supervision. Even with all of these variations, the figures were in close enough agreement to permit the drawing of a characteristic curve.

It is interesting to note that in cases where relatively low viscosity oils were used, the ratio between cost of engine repairs and cost of fuel was very uniform, while in fleets using relatively high viscosity oil, the variations were greater. This would seem to indicate that in the former cases engine repairs were required to take care only of normal wear and tear which was about the same in all cases. In the fleets using high viscosity oil, the cost of engine repairs was influenced by operating conditions, power losses from use of the heavy oil and other conditions which did not affect engine operation when relatively light oils were used.

A careful study of the curve in the chart shows some very interesting facts about engine lubrication. A fleet operator using an S.A.E. 30 oil that rapidly increases to S.A.E. 55 viscosity will spend for engine repairs about 60 cents for every dollar spent for gasoline. Another operator using a good quality oil of S.A.E. 50 viscosity that increases to 55 viscosity will spend about the same amount, the only difference being that in the former case the engine will be slightly better lubricated for the first few miles after the fresh oil is added.

But note that an operator using an S.A.E. 30 viscosity oil can reduce his engine repairs and operating costs to a minimum because of improved operating and mechanical conditions. On the other hand, the operator using an S.A.E. 50 viscosity oil cannot reduce his engine repairs much below 45 cents for every dollar spent for gasoline. Operating costs in general would be higher in using the heavier oil because power losses would greatly exceed those in an engine using a lighter oil.

Experiments in various fleet oper-

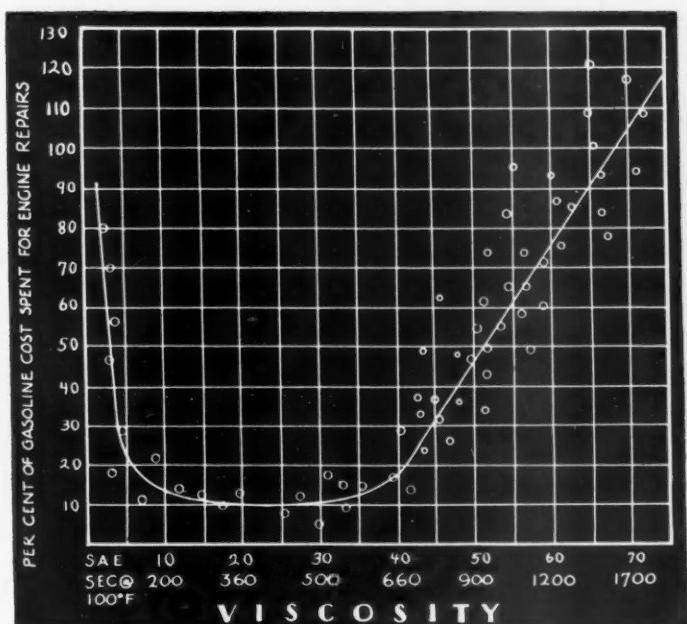
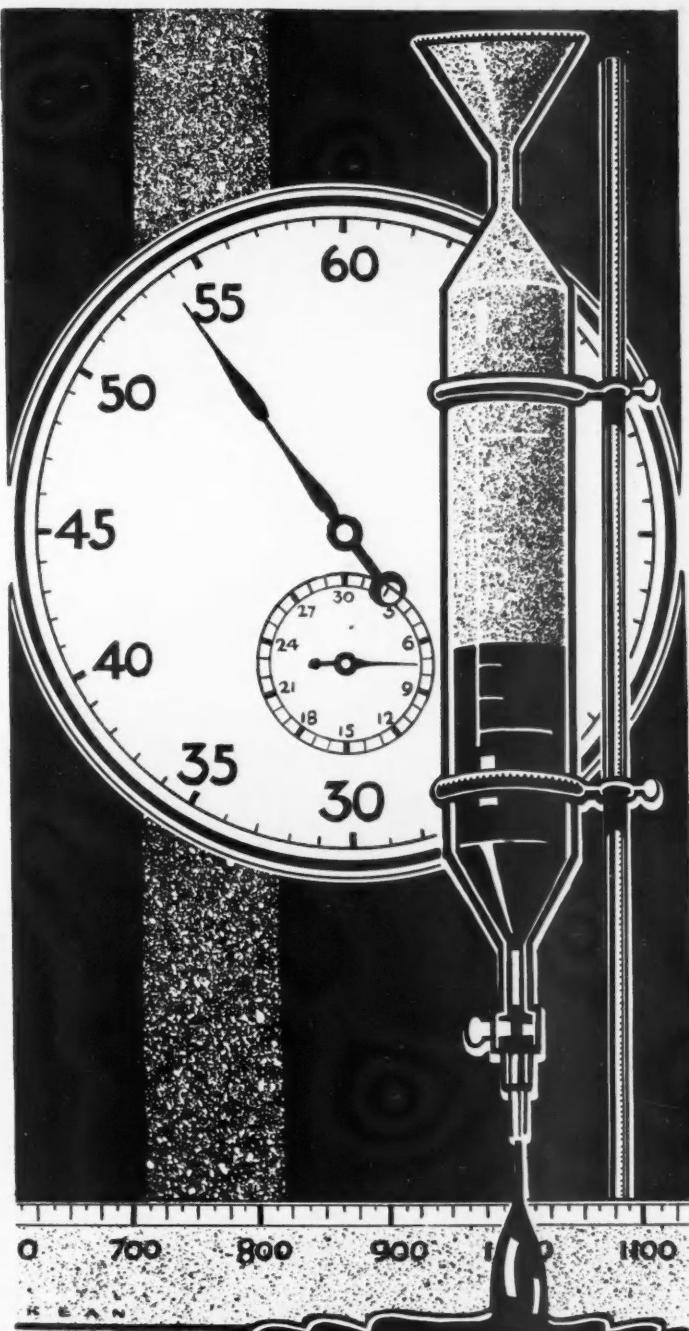
By SILAS I. ROYAL

Lubrication Engineer and Oil Chemist

pare costs of maintaining one engine with another which had done twice as much work. The commonly-used mileage figure has many disadvantages because operating conditions are different and one mile is not at all like another mile. Producing power from a gallon of gasoline is a better basis for engine performance because it takes into account some of these variations.

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ations verify the results shown in the chart. In one fleet, the average test of crankcase oil at drain periods was about S.A.E. 63 viscosity, and 74 cents was spent for engine maintenance for every dollar spent for gasoline. By using an oil that kept the viscosity of oil when drained from the crankcase between S.A.E. 20 and S.A.E. 30, the cost of engine repairs was only 14 cents for every dollar spent for gasoline. In most all cases where a saving was made in engine repairs, there was an additional saving from reducing consumption of gasoline and oil.

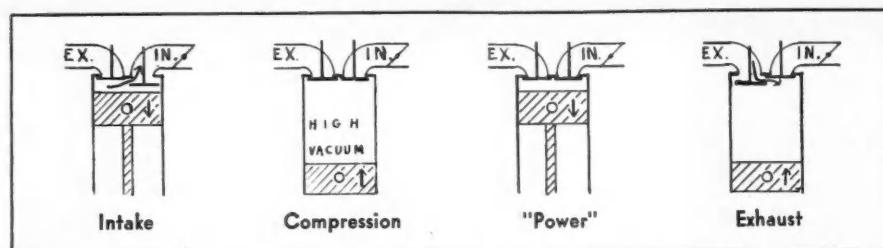
The curve in the chart indicates the boundary of efficient engine lubrication at S.A.E. 10 viscosity and S.A.E. 35 viscosity, irrespective of the size and make of the engine and the conditions under which it operates. Therefore, an oil which will maintain its viscosity between these limits in an engine, while the engine is maintained in the best of mechanical condition, is the best lubricant for the engine. The reason an oil between these limits of viscosity will furnish the best lubrication can be explained by the fact that such an oil possesses certain physical or chemical properties, of unknown nature, which make it a better lubricant for motor vehicle engines, while beyond these limits it does not possess these properties to an equal amount. Although it has never been definitely proven what these properties are, atomization is probably one. Engine oils above S.A.E. 35 viscosity do not atomize as quickly or readily as those below S.A.E. 35 viscosity, and the heavier the oil becomes, the less readily it atomizes.

Complete top cylinder lubrication has never been accomplished with relatively heavy oils, and it appears that top cylinder lubrication depends on the ability of the oils to atomize at engine temperatures. Fortunately, any crankcase oil between the specified viscosity limits will comply with the demand for viscosity to insure bearing lubrication and atomize in sufficient amount to insure top cylinder lubrication.

The result of the investigation of engine lubrication, plotted on the chart, is a logical basis for determining when to drain oil from crankcase. It has been shown that best results are obtained when viscosity of the crankcase oil, when drained, is between S.A.E. 10 viscosity and S.A.E. 35 viscosity. Therefore, it becomes necessary to drain the oil only when viscosity goes above or below these limits, or when it is contaminated by crankcase sludge and free carbon.

No matter how long an oil has been in a crankcase, it will function properly as long as its viscosity is correct and it is free of contamination. Just as soon as it ceases to lubricate properly, excess crankcase sludge and free carbon will be produced and this con-

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Diagrams, explained below, show distorted cycle during deceleration.

Fleet Men Make Progress In Their War on "Gassing"

CONTINUED FROM PAGE 20

turn the exhaust to aroma nor stop exhaust pipe "cracking" during deceleration?

Some phases of this distorted low-pressure cycle are shown in the accompanying diagrams. To start with we must assume that the intake manifold is under high vacuum, because the engine is turning over at much more than idling speed and the throttle is closed, admitting but a small quantity of mixture from the carburetor. When the piston reaches top dead center at the end of the exhaust stroke pressure in the compression space is at, or near, atmospheric pressure. Accept this statement as it stands, please, proof of it will appear as we follow out the four strokes.

With a high vacuum in the intake manifold and atmospheric pressure in the compression space it is obvious that gas will flow backwards through the intake port into the intake manifold when the intake valve is opened. As the piston moves downward on the suction stroke it causes a vacuum in the cylinder and near the end of the intake stroke this vacuum reaches a point where the flow is reversed again and mixture is drawn into the cylinder from the intake pipe. When the intake valve closes, near bottom dead center, there is high vacuum in the cylinder.

Under these conditions the stroke, which ordinarily would be the compression stroke, does not act at all like an ordinary second stroke. The stroke starts with high vacuum in the cylinder, and as the piston moves up towards top dead center this vacuum is reduced but it is a question whether or not atmospheric pressure is attained by the time the piston reaches top dead center. Several engineers have stated that pressure is below atmospheric throughout the entire four strokes of this cycle.

In any event, there is no compression in the ordinary sense of that word and when the spark takes place at or near top dead center, there is a very weak firing, if any. (It is believed that under these conditions combustion may not take place on every firing stroke.) The intake and exhaust valves remain closed and the piston moves downward, not under pressure but is pulled down by the crankshaft, and gasses which were in the compression space on top dead

center are expanded by motion of the piston.

Near bottom dead center when the exhaust valve is about to open, the cylinder in all probability is under vacuum instead of pressure. Therefore, when the exhaust valve opens, the gas in the exhaust manifold moves into the cylinder. As the piston moves upward from bottom dead center, the vacuum in the cylinder is reduced and at some point it probably is eliminated and atmospheric pressure is reached. From this point onward, the piston forces out any gas or air which may be above atmospheric pressure and at top dead center when the exhaust valve closes and the intake valve opens the compression space is filled with gas at, or near, atmospheric pressure. This was the assumption made when we started to explain the cycle.

Because gas enters the cylinder from the exhaust pipe and this is mixed with the incoming charge, it is evident that the gasoline-air ratio is entirely upset. It is for this reason that the charge does not fire each time spark occurs at the plug and there may be several cycles during which the mixture in the cylinder is turned around before it reaches the proper proportions to fire. This explains the occasional shots at the end of the exhaust pipe, commonly called "cracking."

Obviously no possible amount of adjusting of the carburetor can counteract the carryings on in the cylinder during this low pressure cycle. By admitting air to the intake manifold, the high vacuum can be reduced, combustion prevented and the amount of oil pumping which is likely to take place, cut down.

Viscosity Decides Oil Change Period

CONTINUED FROM PAGE 31

dition can be detected. We have found in a large number of tests that after the mechanical condition of an engine is established at its highest operating efficiency and maintained in this condition by adequate supervision, a definite drain period can be established for any given oil. Some oils lasted 4000 miles, others only a few hundred miles, and in some cases the oil lasted only 600 miles.

To determine the proper oil-draining period for a given operation, a sample of oil should be drawn from

the crankcase at 500 miles and its viscosity measured. If the viscosity is within limits of S.A.E. 10 and S.A.E. 35, the oil in the crankcase can be continued in service until 1000 miles. At this point, another sample should be taken and tested for viscosity and for contamination. If the oil is within the specified limit, the test can be continued until 1500 miles, and so on at 500-mile intervals. It may be found that one test period, say 1500 miles, that the oil is above S.A.E. 35 viscosity, or below S.A.E. 10, in which case the test period should be shortened to, say, 1250 miles.

The tests show the limit on viscosity of the oil when drained from the crankcase, and the draining period should be established to maintain viscosity within these limits. This means, of course, that the oil-draining period must be determined for each operation.

Actual viscosity of oil corresponding with the assumed S.A.E. numbers mentioned in this article is given in the chart on page 31.

Special Tools Used By NYC Shop to Cut Time and Labor

CONTINUED FROM OPPOSITE PAGE

one point two straight rods are attached. Between these rods the center lock rod is placed and the two outer rods are held in position by two light welded straps.

Fig. 48—Gear Puller

American LaFrance transmission compound drive gears are removed by a special U-shaped fixture with pressure applied by a standard gear puller.

Fig. 49—Radiator Lifter

A large eye and an old radiator cap form a lifter for large radiators. The shop overhead chain hoist is used to do the lifting.

Fig. 50—Clutch Release

To overcome trouble in releasing a White clutch during assembly while the release assembly is not in place, this device was constructed. It is made of a standard release fork with an L-shaped handle in place of the shaft and a bar on the front to act as a fulcrum.

Fig. 51—Trunnion Bearing Puller

Universal trunnion bearings on White model 45 are pulled by two special pullers and an ordinary "strong back". Construction is plainly shown in the photograph.

Fig. 52—Bushing Arbor

An arbor is used for turning bushings which are used in repairing dump body rear hinges. In this operation the hinges are bored out to a standard oversize, the bushings made on this arbor inserted and the inside of the bushings are then turned outside. The machine and operation of boring the hinges is described in Fig. 31 under the heading "Dump Body Hinge Repair" on p. 36 of the November issue.

SPECIAL TOOLS USED BY NYC SHOP TO CUT TIME AND LABOR

Pullers, Lifters and Spanners Used by the Department of Sanitation to Speed Up Truck Maintenance Jobs

EIIGHT special tools, which are here described and illustrated, supplement those mentioned in the article which appeared in the January issue. They were designed and made in the shop of the Department of Sanitation in the huge New York City Central Repair Shop building. Like others used in the various shops quartered in this, the largest fleet repair shop in the world, these are used to shorten time and reduce labor on truck repair jobs.

This, the sixth of a series of articles, completes the description of shop made devices in this establishment. Permission to visit the shop, photograph and describe the devices and publish this series was granted by Albert Goldman, Commissioner, Department of Plant and Structures; Dr. William Schroeder, Jr., chairman of the Sanitary Commission of the Department of Sanitation, and Edward P. Mulrooney, commissioner, Police Department.

Fig. 45—Gear Puller

A piece of spring leaf is used to build a puller for Pierce-Arrow crank-shaft gears. Strong material is necessary in the lips which fit into slots provided in the gear.

Fig. 46—Clutch Lifter

A special bracket is used to remove and reinstall American LaFrance clutches in connection with a standard overhead or floor crane. This bracket prevents injuries to mechanics fingers, a possibility when ordinary methods are employed.

Fig. 47—Spanner

A spanner which does not slip out of place nor damage the circular nut is made from square section rod. A circle is formed to fit the nut and at

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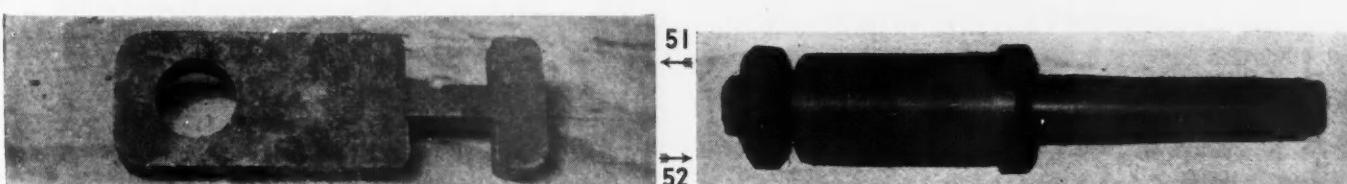
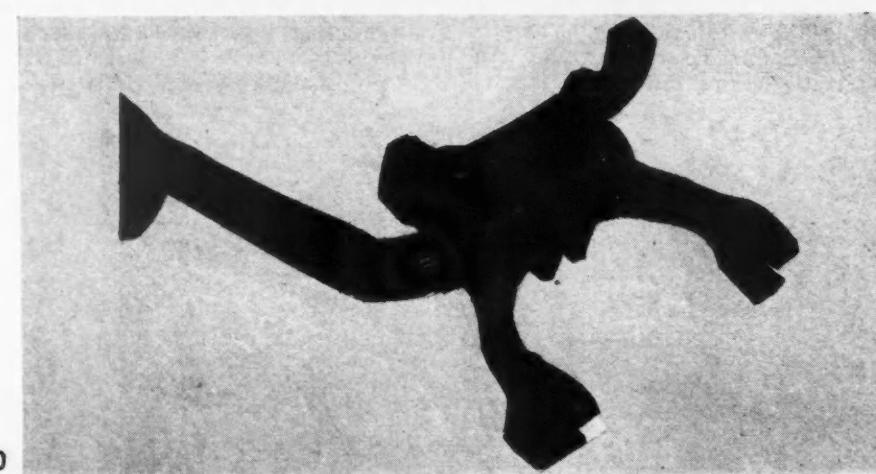
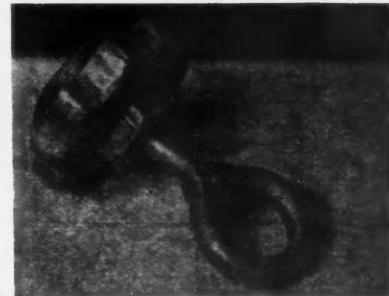
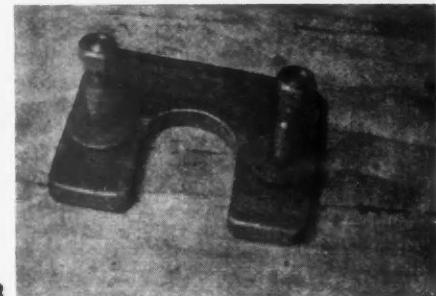
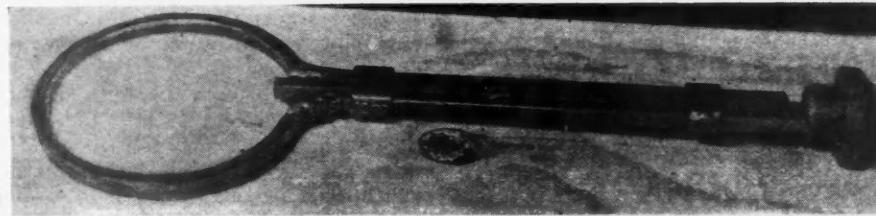
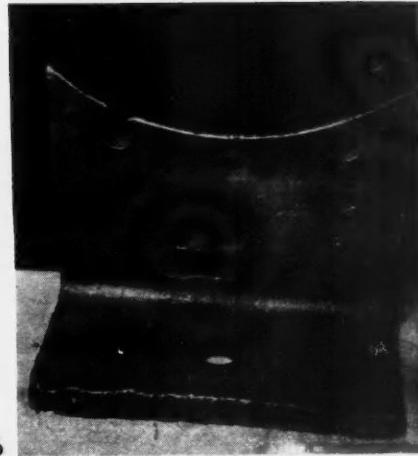
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OSHKOSH 4-WHEEL-DRIVE LINE IS EXTENDED FROM 7½ TO 10 TONS

WITH the addition of two new models and changes in existing models Oshkosh Motor Truck, Inc., Oshkosh, Wis., has completed a four-wheel drive line having a capacity range extending from 1½ to 10 tons and capable of speeds up to 50 m.p.h. The new units of the line are GB 7½ ton and G 7½-10 ton. Specification details of 12 models appear on pages 52 and 53 of this issue.

Hercules six-cylinder engines developing from 68 to 154 hp. furnish power in all models. Down draft carburetion is characteristic of the line and the carburetors are designed to prevent flooding at high angularities. The design also permits the use of central exhaust outlets, which keeps the exhaust heat away from the cab. Fuel is supplied by Stewart-Warner pumps from two 25-gal. tanks mounted outside of the frame on running board brackets. Vortox air cleaners are standard equipment.

Brown-Lipe clutches and transmissions are employed throughout the line and are mounted in unit with the engine except in four models. In the two heaviest models three-speed auxiliary transmissions are used in addition to the 4-speed unit-mounted transmissions.

The 4-wheel drive principle as applied to the Oshkosh line requires the transmission of power to the differential on a level with the axles, which are double reduction Wisconsin. Power is transmitted through a Link Belt chain, or a chain of gears and dropped down to axle level. There is no reduction in the transfer case. An automatic locking differential is car-

Completes Line with 7½-Ton GB and 7 to 10-Ton G, Which Are Equipped with Three-Speed Auxiliaries

ried on the lower sprocket. In the larger models with a series of gears in place of the chain three speeds are available in the transfer case.

Power is applied to front wheels, regardless of steering angle, through universal joints housed in balls and sockets in the front axle. All units, engine, transmission, sub-transmission and cab, are mounted on three-point suspension. The frame is claimed not to bind any unit beyond the operating point even if distorted as much as 16 inches. Side rail channels range from 6 to 10 in. in depth and are made of $\frac{1}{4}$ to $\frac{1}{2}$ -in. stock.

HIGHLIGHTS OF OSHKOSH'S NEW 4-WHEEL-DRIVE LINE

Power is transmitted to front wheels through universal joints housed in balls and sockets.

Power is dropped to the level of the front and rear axles by a transfer case equipped with chain or gears.

Hercules six-cylinder engines developing from 68 to 154 hp. are used throughout line as are Brown-Lipe clutches and transmissions.

Three-speed auxiliary transmissions are employed on the two 7 to 10 ton models.

Wisconsin double-reduction axles are standard.

Cabs specially designed for driver comfort.

Polished cast aluminum shells are used for the fin and tube radiators of the entire line. Fenders follow modern line; hoods are provided with ventilating doors instead of louvers and all trim is nickel-plated.

The driving shaft brake, which is of the external type located at rear of sub-transmission, is another feature of the Oshkosh. Applied at a point where the power is transmitted, from the engine braking is effective on all four wheels. This brake is used as a service brake when the emergency is applied to rear wheels only and is used as an emergency when Bendix Duo-Servo mechanical B-K booster operated unit or Westinghouse air brakes are furnished as service brakes.

The cabs, designed for driver comfort, provide ample leg room, are equipped with side cowl ventilators and have swinging windshields snugly lodged in rubber framing on all sides to prevent entrance of snow. The roof is formed of steel and lined with fabric. Doors are equipped with roll type window raisers. The instrument panel is of passenger car design and carries an engine heat indicator, oil pressure gage, ammeter, speedometer, starter button, choke control and gas gage.

Hudson Puts Essex in Light Commercial Field

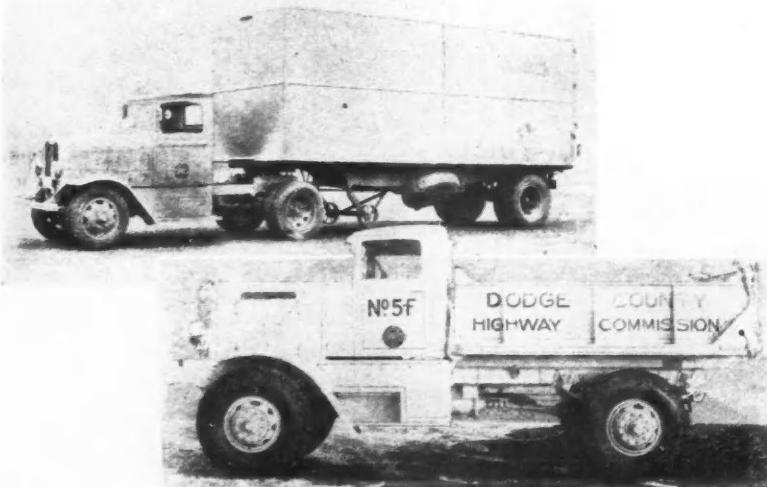
HUDSON MOTOR CAR CO. has entered the commercial field with a light delivery model designated as the Essex Commercial Car. This new unit comes furnished with any of four body types—sedan delivery, cab top express, standard panel delivery and de luxe panel delivery.

The power plant comprises a six-cylinder 2 15/16 by 4 1/4-in. engine developing 70 hp. at 3200 r.p.m. mounted in unit with a triple-sealed, oil cushion type clutch, and a three-speed, silent second transmission.

The fuel system consists of a mechanical pump, triple venturi down-draft carburetor and a 11.6-gal. gasoline tank. The rear is semi-floating.

The frame is of the box-girder designed gusseted with X cross members. It is of pressed steel and has 6 1/8-in. side rails. Springs are semi-elliptic, sprayed at the rear for stability. The front are six-leaf, 31 in. long; the rear, 8-leaf, 48 in. long.

Wheels are steel-spoke type equipped with 17 by 5.25-in. tires. Wheelbase, 106.



Two of Oshkosh's new 4-wheel drives.

GMT PUTS NEW 6-CYLINDER ENGINE IN THE T-18 AND T-23

INTRODUCTION of a new six-cylinder valve-in-head engine, and adoption of this engine in its T-18, 1½-ton, and T-23, 2-3-ton models, places the General Motors Truck Company in the position of building all its own engines.

In basic design the engine follows closely that of the next larger series of powerplants, such as the 257 and 300 series. Maximum torque of the new $3\frac{3}{16} \times 4\frac{1}{8}$ -in engine is said to be 155 ft. lb. at from 1000 to 1800 r.p.m., and peak power 69 hp. at 2800 r.p.m.

This powerplant replaces the former 200 series, which were of the L-head type developed from the Pontiac Six engine, discontinued this year. The latter had a three-bearing crankshaft as compared with a four-bearing type in the new engine, and developed some 23 ft. lb. less torque.

Engine features, in addition to the characteristic G.M.T. valve-in-head design, include semi-steel light weight pistons, chrome nickel iron cylinder heads, downdraft carburetion, center outlet exhaust manifold, oil wetted type air cleaner, crankshaft counterweighted and fitted with harmonic balancer, steel backed interchangeable main bearings removable without disturbing the crankshaft, tapered roller bearing water pump shaft mounting, crankcase ventilation, starter motor, and three point rubber engine suspension, in addition to other features.

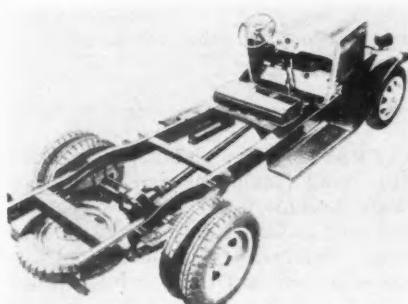
The T-18 and T-23 models which are now equipped with the new engine have new chassis prices of \$675 and \$795, as compared with former prices of \$595 and \$745. Gross vehicle weight is 300 lb. higher for the T-18 and 500 lb. higher for the T-23.

While these trucks are not designated as new models by the factory, there are a sufficient number of changes to actually warrant such a designation. On the T-18, for instance, in addition to the new engine, there is a new high-efficiency type radiator core developed by Harrison and used on G.M. passenger car lines in a modified form for 1933. The single plate clutch is larger, with 92 sq. in. of frictional surface.

While transmissions remain unchanged, propeller shafts are larger in diameter at the rear with a separate bolted flange, while splines are also larger and thicker. Universal joints are now of the spider type with four cylindrical bearings.

Frame sections are heavier and in both wheelbases now have the same frame section, 7 1/16 in. deep. Front

Larger Powerplant with 69 H.P. at 2800 Replaces 200 Series. Chassis Have Many Improved Features



G.M.T.-23 equipped with duals.

IMPROVEMENTS MADE IN MODELS T-18 AND T-23

Larger 6-cylinder valve-in-head engine with a four-bearing crankshaft, the steel-backed bearings being removable without disturbing the crankshaft; downdraft carburetion; semi-steel light-weight pistons; chrome-nickel iron cylinder heads; center outlet exhaust manifold, and three-point rubber suspension.

New high-efficiency type radiator core.
Larger single-plate clutch with 92 in. of frictional surface.

Redesigned propeller shaft and universal joints of the spider type on the T-18.

New cabs of increased seating dimensions.

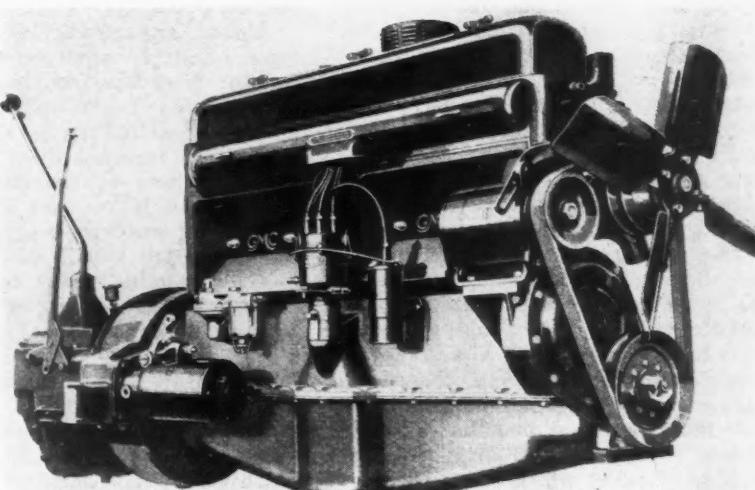
Axes have been redesigned with heavier center section, while rear axles are completely new. In the latter there are now a straddle mounted pinion and a larger pinion shaft; in place of the former two-pinion differential there is a four-pinion type; ring gears are attached with a larger number of larger rivets, and a screw type support is provided for the ring gear to absorb heavy shock loads — thereby preventing springing of the gear. Axle housings are also larger with integral reinforcements.

Brakes have been increased in size at the front wheels. Wheels are of a new eight-spoke type. The dash carries airplane type instruments.

Many of these improvements are duplicated on the T-23 chassis. Here also is found a larger radiator, with the more efficient vertical ribbed cellular construction. There are a larger clutch, heavier frame, heavier front axle section, larger front wheel brakes and new eight-spoke wheels and airplane type instruments.

A new wheelbase chassis, 166 in. long, is now available in addition to the 131 and 157-in. types. This new length is adaptable for school buses and the transportation of merchandise in bodies for which a minimum of rear overhang is desired.

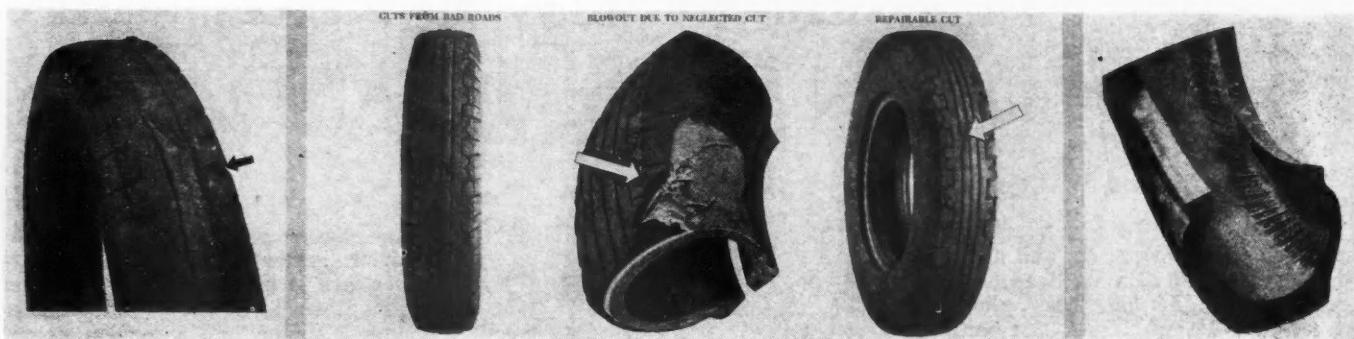
Both models, T-18 and T-23, carry new cabs of increased seating dimensions. The cabs also have a new cadet visor treatment, larger rear windows, narrower front pillars, larger windshields, and a larger and more efficient top cowl ventilator in place of the two side-ventilator type formerly used.



New $3\frac{3}{16} \times 4\frac{1}{8}$ -in. six used in the T-18 and T-23.

Preventive Measures That Help Stop Tire Failures

CONTINUED FROM PAGE 29



The trend of this tire was literally scraped off by running on a wheel that was out of line or did not revolve at a right angle to the axle. Note the feather edge on one side of the tire as indicated by the arrow.

Left: This tire failed because of continuous use on sharp crushed rock or slag roads. Center: This shows a cut through both tread and fabric. The plies have been torn by the sudden release of the large volume of air. The failure could have been prevented by a prompt repair. Right: This illustrates a type of cut that should be promptly repaired to avoid premature failure.

This tire was run almost flat for a considerable distance. Excessive flexing generated heat which softened the rubber, separated the plies and literally tore the cord to shreds. Tires run flat will be damaged inside.

Saving Pennies is O.K. But Don't Pass Up the Dollars

CONTINUED FROM PAGE 24

possible gain in time. A driver may be essentially a salesman (the direct customer contact), hence selected because of ability to get and keep customers, but he can be trained to take such care of a truck that it does not cost the company too much money.

Where a fleet of trucks averages only 20 miles a day, then in spite of good management, the charges for wages, insurance, license, garage rent, depreciation, etc., must be large *per mile*—although they may be low *per package*. But trucks which average 100 miles per day at high speed, and without regard for wear and tear, will cost *more per mile* for repairs, gasoline and tires, than those averaging 60 miles under more reasonable conditions.

To be sure of always making deliveries, some spares are needed. Perhaps only seven trucks of certain price and grade can actually be operated a majority of the time, while three others are in the repair shop, or in reserve. Or, one store may have to operate nine trucks Tuesdays and Saturdays, while six are enough for the balance of the week. In either case the *average cost-per-mile* will be high, because the *average miles per day* for all trucks is low.

The real cost-per-mile is made up as follows. Take the initial price of the truck, subtract what it can be sold for after 3, 4, 8 or 10 years, and you have total depreciation. Add the total *actual cost* for insurance, license fees, garage rental, all repair parts, all repair labor, washing, gasoline, oil and grease, tires, etc. Now divide by the number of miles which the truck has run and you have the *true truck cost-per-mile*.

Trucks in city traffic congestion with many (traffic or delivery) stops should cost more per mile for repairs, tires, and gasoline than trucks in suburban territories. In level country they will cost less than in hilly country; on smooth paved streets less than on rough pavements or no pavement. There is no comparing operation in areas having snow and sleet several months of the year with southern territories not having snow and sleet.

The "standard of excellence" the company desires is another item which affects "cost of delivery." There are florists, modistes, laundries, department stores, etc., which insist that the appearance of their trucks is a profitable advertisement, and truck bodies are selected for beauty of line, are attractively painted and kept looking good by frequent washings, revarnishing, repainting, etc. This extra attention is a form of advertising and while the extra cost is believed well spent, because of increased business, we should not compare the cost of operating such trucks with others where appearance is neglected.

Almost any grade of truck will show relatively small repair expense for the first few months, while the high quality truck will run much longer before having to spend much money for repairs. One truck of a fleet may have run enough miles, or have had such use that an overhaul is required, while the others have not, hence, one truck will show a higher cost for repairs. Don't compare the cost-per-mile of a 10-year-old truck with a one-year-old truck.

Just how much money can sometimes be saved, is illustrated by the following examples:

One of our transportation engineers surveyed a department store which was contracting (by the week) for 30 trucks of various sizes. His survey showed that 24 trucks of

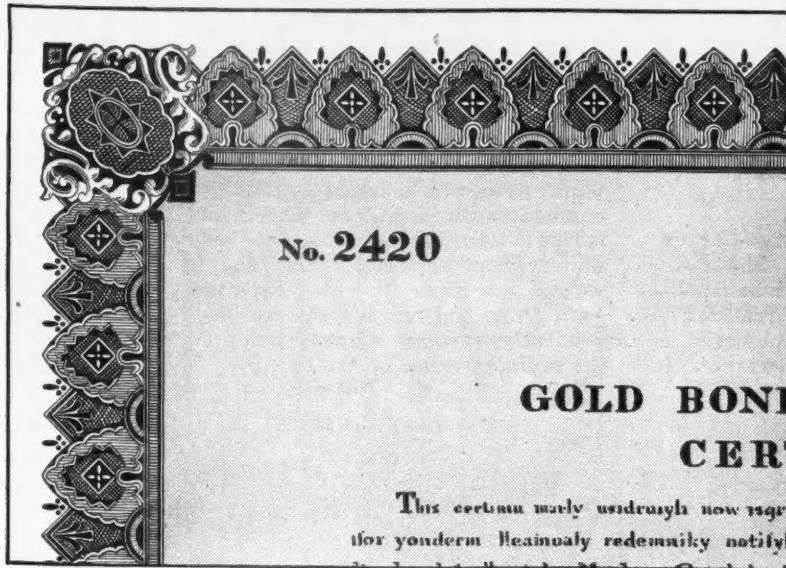
proper size and characteristics, could handle even more delivery volume—and that they could be paid for out of the savings in less than 20 months.

A gasoline company was delivering from a bulk station in a radius of 25 miles. They used six solid-tired 1000-gallon tank trucks, with a top speed of 16 m.p.h., but as the engines were small (poor acceleration), they averaged only 12 m.p.h. The average route was 25 miles with seven customers, at some of which considerable maneuvering had to be done to dump—fill pipe and fittings were not standard. Only one truck could load at a time, at 35 minutes per trip, including lubricating oil, signing the papers, etc., and the sixth truck rarely got away before 9:30 a.m. Trucks averaged two trips (2000 gallons) per day, for a cost of \$13.00 per day, or \$.0065 per gallon.

A two-sided load rack, which cost very little, with larger mains and fill pipes, cut "time in yard" to 15 minutes and all six trucks get away by 8 a.m. Tank capacity was increased at some points and fill pipes were all made 2 inches. This cut unloading time 40 minutes per trip (6 minutes per customer).

Now four (modern) balloon tired, 1000-gallon trucks, which can run 30 m.p.h. and average 16 m.p.h. at no higher repair cost per mile, make three trips each. The four new trucks gave better service than the six old ones, with the following dollars and cents benefit.

The driver is paid the same as before and gasoline, oil, tires and repairs cost the same per mile as the older trucks did. At 75 miles per day, each new truck thus shows a cost of \$16 for 3000 gallons, or \$.0053 per gallon. The six old trucks at \$13 per day used to cost \$78, while the four new (pneumatic) trucks at \$16 cost \$64—an indicated saving per day of \$14 or \$4,200 per year.



Gilt Edge

THREE'S no better security—none sounder, none more sure in its yield—than Lockheed Hydraulic Brakes on a motor vehicle.

Operators of trucks, trailers and buses, in particular, look upon Hydraulics as a gilt-edge investment; as the cheapest, most practical form of protection; paying liberal yield in safety, in low-cost operation, in freedom from trouble, and in the smooth, business-like way they handle their job of stopping.

HYDRAULIC BRAKE COMPANY
DETROIT, MICHIGAN, U. S. A.

LOCKHEED HYDRAULIC

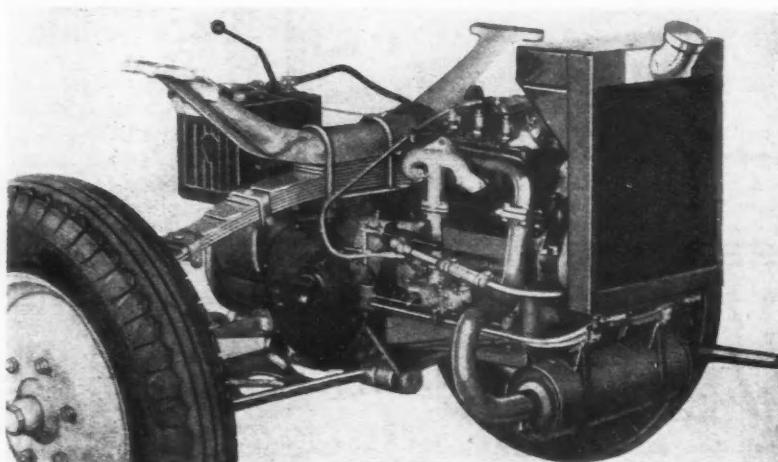
Four BRAKES Wheel

PAK-AGE-CAR + + W & K TRAILER

Stutz Pak-Age-Car Has Removable Powerplant

THE new model Pak-Age-Car exhibited at the National Shows by Stutz Motor Car Co., Indianapolis, contains so many unusual features of design that the casual observer is likely to miss much of importance. It

is controlled by a single lever, without pedals; has a demountable rear power plant unit which includes radiator, engine, transmission, rear wheels and spring; embodies an integral body unit without separate frame and it weighs less than its rated capacity. Both front and rear wheels are independently sprung, without axles in the ordinary sense of the term.



Demountable rear powerplant and rear drive unit.



Showing Pak-Age-Car low floor level.

The front supporting members are three semi-elliptic springs mounted crosswise. Two of the springs are heavier and the steering knuckles are attached to their outer ends. A unique feature is the use of a light spring, which carries part of the load, as a tie-rod between the two steering knuckle arms. The steering gear of rack and pinion type engages a bracket at the center of the light spring.

The rear suspension is by an inverted semi-elliptic spring set crosswise which is attached to a cross piece, dropped at the center, which is attached to the body. Ends of the

TURN TO PAGE 40, PLEASE

Whitehead & Kales Enter Low Price Semi-Trailer Field

A NEW semi-trailer with electrically welded frame, a new selling plan, and a finance plan for dealers and owners, have been announced by Whitehead & Kales, trailer manufacturers, River Rouge, Mich. This company has had more than 15 years of trailer manufacturing experience and is the originator of the "carry-car" trailer.

The trailer, a 5-ton unit, known as the "Traveler," marks the entrance of the company into the lowest price field. It is lighter in weight and lower in price than any previous W & K model.

The new Traveler is being sold direct to truck dealers and, in localities not served by any dealer, direct from factory to consumer. There will be no factory branches or sales alliances of any kind, according to the announcement.

The many innovations in the trailer have been adopted for the purpose of reducing chassis weight.

The frame is of pressed steel, $9\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$ in., all frame members, spring hangers, supports, etc., being electrically welded to make the entire chassis practically one-piece.

Load capacity of the trailer is further increased by the use of extra-long springs (46 in.) with 12 Silico-manganese heat-treated steel leaves, $\frac{3}{8} \times 3$ in. wide. They have a double

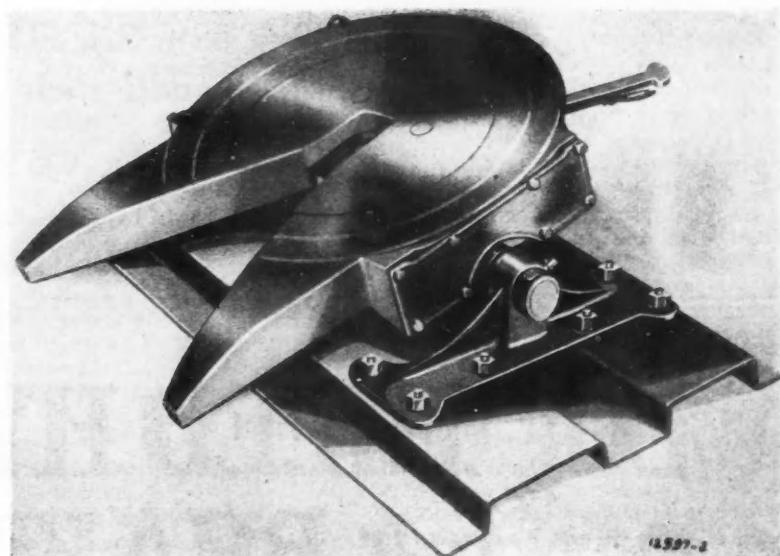
wrapped eye and are bushed. Helper springs are proportionately as sturdy.

The improved semi-automatic fifth wheel used on the new W & K model is interchangeable with practically all other makes of semi-automatic fifth wheels. It is a shock-absorbing, tilting type, 24 in. in diameter. Live rubber cushions absorb road shocks and add to the life of truck and trailer. Locking is positive and fully automatic.

Also incorporated in the Traveler are the W & K improved type radius rods. Their double-swivel action af-

fords an easy, fine, positive adjustment and prevents any binding or twisting of the rods or pins.

Other outstanding features include: improved supports of tubular construction that is strong, yet light in weight; a one-piece king pin; axle, $2\frac{3}{4} \times 2\frac{1}{4}$ in. with $2\frac{1}{2}$ -in. spindles, each fitted with two roller bearings; brake adapters as permanent part of each axle; all frames drilled for light wires and brake lines; and either cast steel wheels with demountable rims, or disk-type interchangeable with tractor wheels.



W & K semi-automatic interchangeable fifth-wheel.



Motor trucks are hauling an increasing volume of farm products, according to reports of field representatives of the Bureau of Agriculture Economics, U. S. Department of Agriculture. Bureau records show that of total fruit and vegetable receipts in eight large markets during the first eleven months in 1932, 36 per cent came by truck, compared with 29 per cent in 1931 and 25 per cent in 1930.

The Texas Motor Transportation Association after several months research into the records of the State Highway Department, State Comptroller, State Auditor, State Tax Commissioner and Texas Railroad Commission, came up with the blasting evidence that commercial motor vehicles in Texas paid twice as much total taxes as the railroads did in 1931, the latest year for which railroad figures are available.

American Road Builders Assn., at the Highway Transportation Session of the recent annual convention in Detroit, passed a resolution advocating repeal of license tax on motor vehicles and substitution therefor of state gasoline taxes. The resolution recommended uniformity of gasoline taxes among states and flat registration fees for all vehicles taxed to extend for life of car or trucks.

The Reo Motor Car Co. has announced a new light delivery speed wagon unit powered by a Gold Crown engine. It is to be known as the Reo 1500 Lb. Light Special Delivery. (Details will be published next month).

Field as well as factory installations of the B-K Super Power System for heavy duty trucks, tractors and trailer units is now available according to the Sales Department of the Bragg-Kliesrath Corp. (This system was described in the September, 1932, COMMERCIAL CAR JOURNAL.)

Under the direction of George Frey, all sales and service activities of the A. C. F. Motors Co. have been coordinated with those of the J. D. Brill Co., Philadelphia, both of which are subsidiaries of the Brill Corp.

Brooke, Smith & French, Inc., of Detroit, is advertising counsel for the Fruehauf Trailer Company, also of Detroit, according to announcement by Harvey C. Fruehauf, president.

The Twin Coach Co., Kent, Ohio, is reported to be operating six days a week with a force of between 350 and 400 men.

Armstrong cork gaskets and cork sheets, made by the Armstrong Cork Co., Lancaster, Pa., are now being distributed to the replacement trade by the Victor Mfg. & Gasket Co., Chicago, under the trade name of Armstrong-Victor gasket products.

G. L. Moyer, sales manager, Handy Governor Corp., Detroit, announces the appointment of the following additional distributor connections: H. P. Schade, Philadelphia, Pa.; Magneto Ignition Co., Tulsa, Okla.; Car Parts Depot, El Paso, Tex.; Balko Battery & Electric Co., Houston, Tex.

The Marmon-Herrington Co., maker of all-wheel-drive motor trucks, has closed the following distributors: Martin Truck Co., Indianapolis; Pacific Hoist & Derrick Co., Seattle, Wash.; Highway Maintainer Co., Lincoln, Neb.; Northwest Machinery Co., Boise, Idaho, and the A. L. MacLean, Calumet, Mich.

Federal-Mogul Corporation, 4809 John R St., Detroit, Mich., is prepared to send a copy of its new 1933 bearing catalog on request to any automotive repairman. The catalog is cross indexed and is a guide to practically every bearing part in use since 1915, covering more than 3200 bearing numbers in both standard and undersize.

A National Parts Congress under sponsorship of the National Standard Parts Association, will be held in the Stevens Hotel, Chicago, early in November.

Personnel

T. G. Shadore, former manager National Accounts Department, has been made assistant sales manager of Four Wheel Drive Sales Co., Clintonville, Wis. Has been with FWD 16 years, starting as a mechanic in 1917.

H. W. Perry has resigned from editorial staff of the S. A. E. JOURNAL. Previously Mr. Perry was with the National Automobile Chamber of Commerce as secretary of the motor truck, highways, legislation and export committees. During 1919 and 1920 he was general manager of the Trailer Manufacturers Association of America.

These Men Wants Jobs

A-15 (37) Nineteen years in truck business. Republic distributor for eleven years, then with White, GMC and International Harvester in wholesale and retail sales. Has traveled extensively through midwestern and eastern states and is thoroughly conversant with trucks, trailers and their appliances, as well as manufacturing practices and policies. Has a large automotive acquaintance. Willing to go anywhere. Available at once.

Walter Tresz has been appointed service engineer for Aluminum Industries, Inc., Cincinnati. He will be assisted by W. E. Bennett, formerly of Procter & Gamble Co.

W. E. Benjamin, formerly sales engineer, Pierce Governor Co., has been appointed sales engineer in charge of the eastern division of Klemm Automotive Products Co., Chicago, maker of governors.

H. A. Prussing has been named vice-president, directing cab sales, and H. A. Yagle, general sales manager for the Taxicab Division of the General Motors Truck Co.

H. A. Gillies, previously sales manager, is now vice-president in charge of sales of American Brake Materials Corp.

Harry A. Fitzjohn, organizer and formed head of Fitzjohn Mfg. Co., Muskegon, is head of the new bus division of Reo Motor Car Co., Lansing.

R. D. Black, former advertising manager of Black & Decker Mfg. Co., Towson, Md., has been named general sales manager.

C. A. Vane, general manager of the National Automobile Dealers Association for more than 11 years, tendered his resignation to the board of directors during New York Show week. He plans to practice law in California.

J. F. Bowman has been named vice-president in charge of sales of Federal Motor Truck Co., Detroit, by President M. L. Pulcher. Mr. Bowman was general sales manager of Federal a number of years ago. He was with Garford for five years and then spent eight years distributing a line of passenger cars and trucks.

Frederick G. Hughes has been appointed general manager and vice-president of the New Departure Mfg. Co., Bristol and Meriden, Conn.

Lewis P. Campbell, a member of FWD Dealer Sales Division during the past year, has been appointed District Sales Supervisor by the Four Wheel Drive Sales Co. of Clintonville, Wis. His territory will comprise Colorado, Wyoming, New Mexico and parts of Nebraska and Texas. He has a long record of service in the highway and railroad building field and is familiar with the problems of these industries.

Servicing Can Be Halted by Design

CONTINUED FROM PAGE 28

Now, here is a question I should like an answer to. Why on a 1-ton truck must we put up with a cast steel wheel with the rim part of it, the wheel and tire mounted weighing almost 100 lb.? In other words, why a 5-ton dump truck wheel when we used to be able to buy trucks with split demountable rims weighing about half? Which tire would you rather change on a wet day? The time required to change a tire on the rim is so much less on the split rim especially if the tire has been on for some time, that for light work it is poor policy to purchase a truck with solid rims and steel wheels. On our truck, I should recommend demountable disk wheels with demountable split rims. They are very easy and quick to wash, paint, take off to get at underneath parts, etc. Also they are very light in weight and if damaged can be replaced at very small cost.

The front axles of trucks are always getting out of alignment. They seem to be too light and the king pins and bushings too small. I think we better put a good sturdy front axle and an oversize steering gear on our truck. While speaking of steering wheels, don't you think that for simplicity and freedom from trouble, all engine and light controls and switches should be placed on the dash and not on the steering wheel? Did you ever work on a light switch located at the bottom of the steering gear after it had become well coated with grease and dirt? If you have, you will agree with me.

The brakes of today are pretty good for stopping—that is, the foot or service brakes—but don't you think larger surfaces would wear longer between adjustments? Evidently, the good, old-fashioned emergency brake has got a new name, parking brake, and serves O.K. if you are parked on a level road, but why not a brake just as good and just as powerful as the service brake? Therefore, on our truck let's have good, big service brakes with quick adjustments and a real emergency brake that will send us through the windshield if we don't watch out.

In looking over the field from the truck users' point, there is not a 1-ton truck made today that fills the need of the baker, florist, grocer, etc. Please remember that in this type of service, a full load in the morning is only a half load in about two hours, so we are running around very lightly loaded over three-quarters of our time on the road. A light-weight truck means more miles on tires, gas and oil, and we are buying these all the time. I think what the industry needs is a good light-weight 1-ton truck.

For fleet use, a truck should be made each year with the same lamps,

fenders, radiators, cylinder heads, wheels, rims, etc., so we can standardize on our service. In all the articles I read, a lot is said about standardizing on factory production, etc., but I think that if some up and coming truck manufacturer would go wild about the fleet users' problems for a year or so, he would find some truck sales never thought of before and these would be repeaters.

Now, this line of thought may be radical and out of the general run, but it gives ideas and the reasons for them.

As I see it, the truck makers are now making a very good general contractor's truck, and talking us light-truck users into using it. Why not give us a truck for light work that is light, so that we can run at a reduced maintenance cost? We want a good 1-ton (not 1½-ton), six-cylinder, valve-in-head, standard-from-year-to-year-on-the-main-parts truck. The wheelbase should be around 130 in. to handle the body for best tire wear. Any part of this truck should be readily accessible in order to cut maintenance cost.

Stutz Pak-Age-Car Has Removable Powerplant

CONTINUED FROM PAGE 38

springs connect with rings supporting the rear stub axles and below there is a rocker arm which swivels on the bottom of the transmission and drive unit housing.

Wheelbase is 90 in., tread 52 in., overall width 61 in., overall length 137½, overall height 84½.

Weight of the vehicle empty is approximately 1800 lbs. and it is rated to carry 1 ton. Volume of the standard body is approximately 260 cu. ft. and for milk delivery it will accommodate 52 standard size quart cases. Turning radius is only 12 ft.

The engine throttle, clutch and brake are controlled by a single lever placed to the right of the steering wheel. The throttle is controlled by twisting the grip, the clutch is controlled by the throttle and the brakes are controlled by pulling the lever backward. The car is started in a gear suitable for operating conditions and ordinarily gears are not changed while the vehicle is in motion. They can be shifted, however, if desired. The gear shift lever is in a horizontal position and it extends forward from the vertical partition in the rear of the driver's compartment.

The engine is a four cylinder Austin with cylinders 2.2 x 3 in., and it is set up for production of 7 hp. The transmission provides three speeds forward and one reverse. Incorporated in the common case is an intermediate reduction gearing and the final drive spiral bevel gears. The intermediate gearing may be changed to alter the equivalent overall gear ratio in less than one hour. The entire rear unit can be replaced within

15 minutes. The radiator is flushed with the rear of the body.

The front wheels extend forward of the body and the tires act as bumpers when the vehicle contacts an object. In a test, the vehicle was driven into a brick wall with no results other than stalling the engine. The body which has rounded corners is made of steel and metal veneer panels consisting of three or more plies of veneer to which sheets of metal are attached on both sides.

Truck Replacement

Market Grows Huger

CONTINUED FROM PAGE 11

the first to disclaim any such good fortune. For one thing they do not view the 407,644 vehicles registered as trailers as any measure of past accomplishment or as a gage of their potential market. This is because they estimate that about 65 per cent of the registered trailers are not trailers in the truck sense of the term. They are the camp trailers and the two-wheeled carts that are made by any blacksmith shop.

And yet, even accepting this deduction of 65 per cent, the statistics would tend to show that 20,000 real truck trailers were added during 1932 as new trailer registrations. To the few trailer manufacturers who were selling nationally a few years ago this 20,000 would have spelled prosperity. But during those few years the number of manufacturers courting the national market has easily tripled, counting of course the truck makers who are marketing their own trailers. The 20,000 distributed among them and the many sectional manufacturers would hardly be sufficient cause for manufacturers individually to heave their hats skyward.

However, it is not to be denied that acceptance of trailers by operators is growing, due both to the influence of legislation and the increasing emphasis on scientific transportation and economical operation. The future, consequently, is an encouraging one.

The statistics on truck registrations, sales, production and replacements presented in the accompanying tables require no elaboration. In detail they tell the story of 1932 truck business.

A Governor Speaks

Immediate repeal of the truck law and a one cent reduction of the gasoline tax was urged by Gov. Chas. W. Bryan of Nebraska in his message to the state Legislature. "If it is desired to regulate motor vehicles for the protection of the roads, it can be done without such drastic legislation that would seriously handicap the trucks in operation and would automatically remove hundreds of them from the roads," he said. "Others would have to greatly increase their transportation rates, thus destroying the only competition that the railroads have ever had, which protects the public from excessive freight rates."

Here's the wheel
that gets the
toughest wear

We challenge
you to put the

Goodyear Tire THERE!

IF YOU haven't yet changed all around to Goodyear All-Weather Balloon Truck Tires—

Try one on your worst wheel—the rear right—the wheel that takes the toughest punishment.

Match its wear, miles, safety, economy, against any other tire in the world.

A Goodyear leaps to meet a challenge like this, because a Goodyear knows it can win.

Only Goodyear gives you the famous All-Weather Tread—the sure-pull, hard-biting, center traction tread that resists slip from all directions.

Only Goodyear gives you the shock-absorbing body built of patented Supertwist Cord—the cord



27,000 miles already—and look at the tread!

that stretches up to 61 per cent farther than ordinary cord and stretches your dollars to cover thousands of extra miles of hard trucking.

Goodyear built the first pneumatic tires for trucks—has longest experience. Goodyears are proving coolest running, least trouble, lowest cost per mile on millions of trucks. See your Goodyear Truck Tire Service Station.

HAVE YOU THE RIGHT TIRES FOR THE JOB?

Goodyear offers by far the widest variety of Truck Tires. There's a Goodyear for every type of truck, trailer and tractor. The Goodyear Truck Tire Service Man will help you stretch mileage, reduce costs. You pay no more for Goodyear quality.

GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND

The New York Show As a Fleet Man Would See It

CONTINUED FROM PAGE 12

for longer periods. Trucks, too, are stepping out as never before but we must credit passenger car engines with a high order of performance.

Thin shell babbitt lined interchangeable type connecting rod bearings seem to be making a hit. To shop men they offer the advantage that they can be replaced without removing rod and piston assemblies. If rods are removed from above the cylinder head must be taken off to install rod bearings of the cast type.

Power plants, which are free to wiggle more or less, are found in many passenger cars. Truck men have been wondering about this type of mounting for truck engines, with some misgiving about allowing a 150-hp. truck engine to oscillate. The new Dodge commercial cars come right out with "floating power" and there we are.

•Elliptical Pistons

Pistons, pins and rings are receiving special attention from designers. High speeds and heavy duty take their toll in oil consumption and wear of parts. Some pistons are cam ground, that is made elliptical, so that they will be round when hot. Pistons with a T-shaped slot are used by at least five manufacturers.

Rings are narrower and more numerous. Width is down to $\frac{1}{8}$ in. to $\frac{3}{32}$ in. in a few instances. This construction reduces friction and the tendency to round off the upper and lower corners. Number of rings has gone up to four and even to five. This is going in the direction of Diesel engines which must maintain compression at all costs. In the gasoline engine field oil control is probably the reason for using more rings. Two sections with a groove between are found in the new "hydraulic" rings as introduced by Wilkening Mfg. Co. This design provides two separate bearing surfaces on the cylinder wall, or rather the oil film on the wall, with oil between.

If spark timing on the newer engines is ever less than perfect it will not be due to any lack of concern on the part of designers. Semi-automatic timing, accomplished by a centrifugal governor which advances spark as speed increases, has been in use for some time. A second control depending upon vacuum in the intake manifold has been introduced and Chevrolet provides a knurled knob for manual adjustment of the basic timing, under the name "octane selector." They recommend setting the timing according to the fuel used.

Stock bodies have been developed and refined until they can be used for services which formerly called for custom jobs. Dodge and Chevrolet, on opposite sides of an aisle at New York, showed the vocational application of stock bodies by displaying

complete jobs lettered with names of new owners. One express job, owned by a fruit store specializing in steamship baskets for departing travellers, contained such an attractive display of packed fruit that attendants and the public had difficulty in restraining an urge to sample the display.

Engineers are not leaving the rotation of the fan to any mere chance. Twin V-belts drive the fans on several vehicles, a new Lycoming engine has three V-belts to operate fan and air compressor. The latter unit has a water-cooled cylinder head. Air compressors, in fact, are more and more resembling miniature engines, in general design. And, speaking again of cooling G.M.T. is using in the T-18 model a new type of radiator core by Harrison which is embodied in several of the General Motors passenger car models for 1933.

While looking over the passenger car displays and listening to the learned gentlemen who explain the special show chassis to the persons crowded about polished railings I heard about a number of features of design which the speakers claimed or intimated were new in the industry. I made note of them with the intention of looking up the records when I returned to the office. Alas, the gentlemen were mistaken, in more than one instance, in describing features of design as new and as originating in the passenger car field. Search through index of COMMERCIAL CAR JOURNAL shows that many of these "new" features were used in trucks years and years ago. The designs are worthy of note in a review of the Shows but for the information, and perhaps the amusement, of truck men we add the reference to the prior description of the development in C. C. J. back copies.

Use of worm drive in the Pierce-Arrow eight-cylinder job was extolled

by salesman on duty at the show chassis. 'Tis a strange coincidence that the company introduced worm drive in its passenger car line on the twenty-second anniversary of its own introduction of worm drive in the truck field. (The worm drive Pierce-Arrow truck was described in the March, 1911, issue of C. C. J.)

"Power braking has made a great deal of progress this year in the passenger car field. B-K booster brakes will be standard equipment on no less than nine makes, * * *" says P. M. Heldt, engineering editor of *Automotive Industries*, in his review of the 1933 models. More than 315 models listed in C. C. J. Specification table carry either vacuum or air brakes. (The B-K booster appeared in the December, 1925, issue of C. C. J.)

Four-wheel brakes are so common that the chassis explainers took them for granted. There were improvement, of course, but that was all. (Four-wheel brakes appeared in the truck field as early as Nov., 1913, on the Jeffrey Quad. See Nov. C. C. J.)

•Nothing's New, It Seems

Free wheeling engaged the attention of almost all of the passenger car exhibitors. We were given to understand that free wheeling developed just a short time ago had been refined and improved. (Free wheeling was introduced in 1907 by International Harvester on a power-driven high wheel passenger vehicle.)

Rubber mounting of engines and other parts is more popular than ever. The never-tiring booth attendants were not backward in crying its advantages. (Mack sprung rubber mounting of springs, transmission, gasoline tank and steering column in a bus in October, 1923. They also incorporated rubber insulation in a practically-no-angle universal joint at about the same time.)

It appears that use of cast iron has helped the passenger car engineers put more braking ability within drums of smaller diameter. (Approximately 500 truck models now have cast-iron drums, front or rear or both.)

X-type frames are going ahead in a big way. Allowing an engine to move within the frame eliminated the engine structure as a frame cross member, therefore frames must be braced by other means. One passenger car, representative claimed that his company originated the X-type frame. Perhaps he did not take time to look up the record. (The X-brace was embodied in the Safeway six-wheeler shown in July, 1924, C. C. J.)

There was much talk at the show about independently sprung wheels and rear engines for the near future. Both ideas are incorporated in the new Stutz Pak-Age-Car. The truck field has other features which passenger cars can "borrow" such as: dry sump lubrication and waterproof ignition in the White 12-cylinder opposed engine or power steering. And there are many more.

Chase Made Directing Editor

Julian Chase has been appointed directing editor of the Chilton publications succeeding Norman G. Shidle, resigned. Mr. Chase returns to the directing editor's chair after an absence of five years, during which period he devoted his energies to the business management of *Automotive Industries*.

Mr. Shidle's plans for the future include contributing regularly to a number of publications, as well as devoting part of his time to the editorship of the S. A. E. JOURNAL.

Don Blanchard, formerly editor of COMMERCIAL CAR JOURNAL and later editor of AUTOMOBILE TRADE JOURNAL, has been named editor of *Automotive Industries*.

Leon F. Banigan, editor of MOTOR WORLD WHOLESALE and then Marketing editor of the Chilton Company, when that publication was merged with AUTOMOBILE TRADE JOURNAL, is now editor of AUTOMOBILE TRADE JOURNAL.

Engineers Turn Thoughts to Radical Automotive Ideas

CONTINUED FROM PAGE 21

present in connection with the development of automatic transmissions. If the public demands them, they will appear as standard equipment."

Some designers are looking forward to transmission systems in which an infinite number of ratios are provided between engine and wheels, for example, the gas-electric drive. Others are interested in automatic or partly automatic control of sliding gear or constant mesh sliding dog clutch transmissions. Planetary transmissions, the type used in the Model T Ford, but with at least two speeds in addition to direct, have been incorporated in several designs.

Typical of the semi-automatic transmissions are those which have a short lever below the steering wheel which controls, but does not engage, the various gears. The lever can be moved to any desired position and the next time the clutch pedal is depressed the gear is engaged automatically.

Allied with automatic transmissions are automatic clutches. E. E. Wemp, Long Mfg. Co., discussed centrifugal and hydraulic clutches, expressing a preference for the centrifugal design for American use at the present time. He displayed slides showing construction of clutches of this type developed by Borg & Beck and by his company.

Design of a centrifugal clutch must meet several very exacting requirements. These include a pedal release to be used when the engine is operating at more than ordinary speed, a means of conversion to a conventionally operated clutch when desired, freewheeling and accuracy in manufacture.

● When Conversion is Needed

Conversion is needed when it is desired to have the clutch engaged when the engine is stopped, as when parking on a hill in gear and when towing the car to start the engine. The clutch can be engaged without centrifugal action by mechanical means or by a vacuum cylinder.

Hydraulic couplings, commonly designated fluid flywheels, were not neglected by Mr. Wemp although he prefers the centrifugal. It is used with a self-changing planetary transmission in the English Daimler car.

Two engineers, at least, went to the very foundation of modern automotive engineering to raise questions. Walter T. Fishleigh, consulting engineer, questioned whether axles, either front or rear, are desirable, and raised a doubt about gasoline as a fuel and the four-stroke Otto cycle as the proper operating cycle.

The four-stroke cycle was put on the defensive also by Herbert Chase. He awarded the two-stroke cycle "remarkable possibilities in respect to compactness, high power for a given size and weight and high economy at

light loads." He asked why engines could not be placed "below decks" (this has been done by White) and advocated rear position for engines. Then he boldly predicted a cylinder arrangement different from the simple in-line model.

Extreme pressure lubricants, which rate much attention from investigators these days, were discussed in a paper read by S. A. McKee, of the Bureau of Standards, which is working on the problem of testing these lubricants. Tests to be of value must show results comparable with actual service and it developed during discussion that Mr. McKee is developing a test machine which will closely approximate service conditions.

Legislation covered the transportation and maintenance session like a tent. T. R. Dahl, vice-president, The White Co., presented a paper on that very subject under the title "Legislation Affecting Motor Vehicle Trans-

portation," including so much information on the subject that it was agreed that use of facts at hand rather than the collection of them was the problem of the day.

The railroads' efforts in legislation did not escape notice and Mr. Dahl suggested the introduction of bills in legislatures calling for increased taxation on railroads and elimination of grade crossing as counter-offenses to be used for trading later on.

Mr. Dahl charged the railroads with fostering legislation "as a smoke screen to hide their glaring inefficiencies." And he added, that "The motor vehicle operator is now being asked to pay for such gross inefficiencies on the part of the railroads as the loss by one organization of twenty million dollars in a hotel in New York City."

The case for motor transportation should be taken beyond argument and the establishment of economic premises directly to the public, said Mr. Dahl. He was seconded by such well-known leaders in the fight as A. J. Scaife, White Motor Co., retiring president of the S.A.E., Merrill C. Horine, of the Mack Company, newly elected vice-president representing Motorcoach and Motor-truck Engineering in the society, and Pierre Schon, General Motors Truck Co., himself a speaker on legislation at previous meetings.

Inefficiencies of the railroads were criticized in the Motorcoach and Motor-truck session by E. J. W. Ragsdale, chief engineer high tensile division, Edward G. Budd Mfg., Philadelphia, Pa. He showed that a railroad express train traveling between Philadelphia and New York city weighs 3500 lb. per passenger carried and that the tariff on this weight of cast iron if shipped as ordinary freight would be \$10.50, but the passenger responsible for the dragging of this weight at high speed between the two cities pays only \$3.24 fare.

● Why Not a Fuel Rating

A six-wheel power truck on the railcar weighs only 285 lb., but it carries 7000 lb., of power equipment including a 125-hp. Cummins Diesel engine, generator and storage batteries.

There is need for a rating for fuels for high speed oil engines similar to the octane rating for gasoline and diesel engine designers and oil producers should cooperate to solve a common problem. In making this recommendation Max Hoffman, diesel engineer, Waukesha Motor Co., stated that specific gravity, which is the most commonly used rating for diesel fuels, fails to show the period of delay of ignition following injection of fuel and is, therefore, unsatisfactory as a knock rating. He recommended that the fuel rating include a knock rating, specific gravity, viscosity at 70 deg. F., pour point, Conradson carbon, water and sediment and sulphur content.

NEW FORD FLASHES

The new Ford V8 cars which will be displayed in dealers' establishments on Saturday, Feb. 11, are larger, more powerful and of improved appearance, compared with the first V8's. Wheelbase has been extended from 106 to 112 in. and the new bodies are almost 12 in. longer than formerly. Power of the engine has been stepped up to 75 hp. at 3800 r.p.m. without changing cylinder dimensions. Bodies are in the modern mode with slanting radiator and grille, windshield at 20-deg. angle, skirted fenders and flowing lines on hood and body.

Major parts of the engine are the same except the cylinder heads which are now of aluminum. The compression ratio has been raised to 6.33 with corresponding increase of maximum compression pressure from 114 lb. to 138 lb. Torque has been raised from 123 to 149 ft.-lb. Plugs are 18 mm.

The new frame is of double drop type with an X-brace. The ends of the X are extended forward inside the main channels, and to the rear almost to the ends of the frame, making a double channel for much of the frame length. Main channels are 6 x 1 3/4 x 1/10.

The rear axle is of three-quarters floating type, but it now embodies a straddle-mounted pinion. Transverse springs front and rear are of characteristic Ford design.

Bodies have an integral pan at the bottom extending forward to the footboard space. This pan is arched at the rear, forming a tunnel for the torque tube and there is a circular opening under the rear seat to provide axle housing clearance.

Prices had not been released when this was written (Wednesday, Feb. 8), but are expected to be lower than on the V8. De luxe models probably will be \$50 higher than corresponding standard jobs.

Coordination Is Way to End Distribution Waste

CONTINUED FROM PAGE 13

destroy these forms of competing transportation. This is not generally realized, but those who have followed the activities of the railroads in their fight against waterways and highway users are well aware as to the extremes to which this fight has been carried by a certain number of less progressive railroad managements. Restrictive trucking laws have been fostered and passage secured by the railways in a number of states such as Kentucky, Texas, Mississippi and Alabama, which were without the slightest scientific basis either as to regulation, taxation, dimensions of vehicle or rates for the safety and convenience of the public on the highways or for the protection of the highways and bridges themselves. Fortunately for railways and other forms of transportation, a number of independent and effective efforts are being made at this time to correct these serious evils and to bring peace to the warring transportation forces.

One thing we must all realize whether on the railroad or hauler side of this controversy is, that the shipper is equally interested in all forms of transportation and that a fair and prompt settlement of the controversy between the railroads and highway users is the most urgent question before the public in the transportation field at this time. This settlement is a condition precedent to the proper coordination of our transportation facilities in the interest of an efficient low cost distribution. Such a settlement must be just if it is to be generally accepted. It must be based on securing for the shipper, that is for the public, the best service at the lowest possible cost.

● Regulation Less Needed

Until very recently the railroads had no serious competition and therefore their service was in the nature of a monopoly requiring rigid regulation in behalf of the shipping public as to rates, prevention of rebates and other unfair discriminations, but today a formidable competition for the railroads in carrying both passengers and freight has sprung up in the shape of the motor vehicle. It is therefore much less necessary to impose on the railroads the wide ramifications of regulation under the Interstate Commerce Commission than formerly, and the National Transportation Committee [of which the late Calvin Coolidge was chairman], which is studying all problems of railroad finance, service and operation, will undoubtedly recommend the relaxation of many regulations which only burden railroads and increase shipping costs.

Such regulation as is imposed must be carefully safeguarded so as not to raise the cost of transportation

over the highways to meet the arbitrary level set by the railroads. The method of determining rates by the two agencies is entirely different. The railroads, unfortunately, did not develop in the early days their rates on some reasonable basis of actual cost per ton-mile plus terminal charges, but rather set up an artificial rate base determined by the amount the traffic would bear. They have been plagued by this artificial and unsound rate base for many years and are now gradually working toward a simpler and more equitable system based on hauling cost. The motor truck, having grown up without regulation and subject to intense competition from the railroads and from truckers themselves, has developed a system of rates based on cost of hauling as determined by this intense competition. Many shippers are urging that regulation be removed from every form of transportation, that all government subsidies be eliminated from each and that each class of transportation service be placed on an open competitive basis. Although this has many advantages, it seems to me that it goes a little too far back toward the rule of the jungle, but surely the public requires much less protection through regulation than before highway competition developed. This should be limited to protection against discrimination of rates to different shippers.

● Railroads Should Modernize

It would be profitable for the railroads to carefully study every phase of their operation with a view to the making of every possible economy in every branch of its operations as well as to utilize all other improved methods of transportation, whether by rail or truck, that would improve the service to the shipper.

Several committees impressed with the vital importance to shippers of solving the existing controversies, are working vigorously to arrive at a compromise that will bring a better understanding to railroads, trucks and buses. I look for such an agreement in the near future and when this treaty of peace is signed, the railroad executives can then go back into transportation problems and work out economies and improvement in methods that have been neglected. With the exception of the efforts of a very few railroad leaders, little has been done to coordinate railway, highway and water transportation agencies into well balanced, coordinated transportation systems having flexibility to meet all reasonable shipper requirements as to the best method of long and short hauls and combined hauls by different means of transportation. The railroads of the country, being well organized into strong systems, with high grade management, should not hesitate to use buses and trucks where best suited for the purpose. In fact, railroad companies should become transportation companies in the broadest sense of the word and use all

kinds of facilities best suited to each particular purpose. The railroads should study carefully all feeder branches and short haul lines with a view to their abandonment where advantageous, with replacement of rail service by buses and trucks.

In a study made by a commission appointed by the Governor of Rhode Island recently, it was found that in New England alone there are over two thousand miles of branch track that should be abandoned with write off of \$200,000,000 of investment and corresponding reduction in transportation fixed charges against the shipper.

● Tractor-Trailers Better

Door-to-door pick up service, using demountable body and car container, should be extended and new pick up service with tractor-trailers should be established, semi-trailers being lifted bodily onto flat cars for haul to terminal station and there distributed by the tractors of the shipper or railroad, to warehouse, store or dwelling. This type of service, which is now being studied by one of the leading railroads, would have many advantages in economy and convenience over the present container and demountable truck body method. The tractor-trailer method would allow the private hauler to collect and deliver to the railroad with his tractor, using his own or the railroad semi-trailer for shipment to distant points by rail. On arriving at destination, a tractor owned by the railroad or shipper in local service, would distribute the shipment from door to door. In this way almost the entire cost of terminal handling would be eliminated and there would be no waste time for the motorized unit at each end.

The largest element of expense in shorthaul shipments by rail is the cost of getting freight delivered to the station, through the warehouse, into the car and the reverse operation at the end of the journey. A recent study indicates that the average cost per hundredweight for handling freight by various kinds of transportation from shipper door to that of consignee is, for short distances, almost entirely dependent on the cost of the terminal service. It was found that below 110 miles it was more economical to use a 5-ton motor truck than to use the best type of rail car method, while for the continuous car this point is about 70 miles. It was also found that the tractor and semi-trailer when well organized, compete favorably with the present rail methods for distances up to 250 miles.

A detailed study of these various relations between the different forms of transportation will eventually lead to a sound solution of our transportation problems by complete transportation systems that may be developed in the future, and as a result, the producer, the shipper and the consumer will each receive his fair reward for the service rendered by him to the public.

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CHEVROLET PASSENGER CARS AND TRUCKS

COMMERCIAL CAR JOURNAL'S

CORRECTIONS ARE MADE EACH MONTH FROM DATA SUPPLIED DIRECT BY TRUCK MAKERS +

Line Number	MAKE AND MODEL	GENERAL (See Keynote)				TIRE SIZE		MAJOR UNITS				FRAME		
		Tonnage Rating	Chassis Price	Standard Wheelbase	Max. W. B. Furnished	Front	Rear	Engine	Transmission	REAR AXLE		Side Rail Dimensions		
					Gross Vehicle Weight	Chassis Wt. (Stripped)		Make and Model	No. of Cylinders Bore and Stroke	Make and Model	Location and Forward Speeds	Gear Ratios		
											Aux. Location and Speeds	In High	In Low	
1	A.C.F.	160	6	6950	186	222	26000	10170	B9.75/22	HaS 160	6-4½x5½	BL 1714	U 4 Op Tim 76730	2F R 7.46 52.7 8x3
2		175B	6½	8300	186	222	26000	10750	B10.50/22	HaS 175	6-5x6	BL 714	U 4 Op Tim 76730	2F R 7.46 38.6 8x3
3		175A	7½	8800	186	240	30000	11610	B10.50/24	HaS 175	6-5x6	BL 714	U 4 Op Tim 79730	2F R 7.48 38.7 8x3
4	Armeled	11 Ha	2½-3	1570	160	195	11500	4070	B7.00/20	Con 16C	6-3½x4½	Fu WXB	U 4 Op Tim	BF H 5.83 31.2 6x3x3
5		21 Ha	2½-4	2185	160	207	15300	4783	B8.25/20	DB8 25/20	6-4½x4½	Fu WXB	U 4 Op Tim	BF H 6.06 38.5 6x3x3
6		31 Ha	3½-5	2745	146	213	19500	5838	B9.00/20	Her WXC	6-4½x4½	Fu MU	U 4 Op Tim	BF H 6.20 39.7 8x3x3
7		41 Ha	3½-5	3050	160	227	23000	6600	B9.75/20	Her WXC	6-4½x4½	Fu MU	U 4 Op Tim	BF H 6.02 39.2 7x3x3
8		61 Ha	5-7	3625	146	227	24000	7400	B9.75/20	Her WXC2	6-4½x4½	Fu MU	U 4 Op Tim	BR H 6.83 43.8 7x3x3
9		71 Ha	7-9	4595	164	235	29500	7800	B10.50/20	Her YXC	6-4½x4½	Fu MU	U 4 Op Tim	WF H 8.55 55.2 8x3x3
10	TRDA	10		3985	148	174	39000	6450	B9.75/20	Her YXC	6-4½x4½	Fu VUOG	U 4 Op Tim	WF H 8.55 55.2 8x3x3
11	Attbury	A	1	1095	132	145	7000	3400	P30x5	Lyc WTG	6-3x4	Wa T9	U 4 Op Tim	2F R 7.8 56.8 7x3x3
12		K 1½		1595	145	160	8000	3640	P32x6	Lyc WTG	6-3x4	Wa T9	U 4 Op Tim	2F R 7.8 56.8 7x3x3
13		G 2		1985	160	160	10000	3955	P32x6	Lyc 45L	6-3½x4½	Co F4B	U 4 Op Tim	2F R 7.8 56.8 7x3x3
14		45 2-2½		2375	175	188	12000	5300	B7.50/20	Lyc ASD	6-3½x4½	Co W4C	U 4 Op Tim	2F R 7.8 56.8 7x3x3
15		50 2-2½		2950	180	202	14000	5800	B8.25/20	Lyc ASD	6-3½x4½	Co W4C	U 4 Op Tim	2F R 7.8 56.8 7x3x3
16		R 3		3700	173	199	16040	7250	P34x7	Con 18R	6-4½x4½	BL 35-4	U 4 Op Tim	2F R 7.1 37.4 7x3x3
17		60 3		3150	190	215	16000	6000	B9.00/20	Con 18R	6-4½x4½	BL 35-4	U 4 Op Tim	2F R 7.1 37.4 7x3x3
18		65 3-5		4050	209	221	18500	7800	B9.00/20	Con 18R	6-4½x4½	BL 35-4	U 4 Op Tim	2F R 7.1 37.4 7x3x3
19		70 3½-4		4650	222	222	23000	8400	B9.75/20	Con 20R	6-4½x4½	BL 51-5	U 4 Op Tim	2F R 7.1 37.4 7x3x3
20		C 3½-4		4750	186	220	19315	8300	B36x8	DP36x8	6-4½x4½	BL 51-5	U 4 Op Tim	2F R 7.1 37.4 7x3x3
21		100 5-6		5675	223	237	28000	9100	B10.50/20	DP10.50/20	6-4½x4½	BL 55-7	U 4 Op Tim	2F R 7.1 37.4 7x3x3
22	Autocar	R 1½		2250	159	189	5370	B7.00/20	Own R	6-3½x4½	BL 234	U 4 Op Own A	SF R 5.22 33.5 6x3x3	
23		F 2		2450	159	189	5750	B8.25/20	Own R	6-3½x4½	Own T	U 4 Op Own D	SF R 5.22 33.5 6x3x3	
24		RG 2		2600	159	210	5975	P34x7	Own R	6-3½x4½	Own T	U 4 Op Own D	SF R 5.22 33.5 6x3x3	
25		A 2½		3000	150	192	6350	B8.25/20	Own SD	6-4½x4½	Own D	U 4 Op Own A	SF R 5.22 33.5 6x3x3	
26		D 3		3500	150	192	6375	P34x7	Own SD	6-4½x4½	Own D	U 4 Op Own D	SF R 5.22 33.5 6x3x3	
27		DE 3½		3850	150	210	7000	B9.00/20	Own SD	6-4½x4½	Own T	U 4 Op Own TE	2F R 6.43 40.7 8x3x3	
28		DF 3½		3950	150	192	7075	B9.00/20	Own SD	6-4½x4½	Own T	U 4 Op Own TE	2F R 6.43 40.7 8x3x3	
29	(Eng. und. seat) HS	3½		4600	114	161	7900	P40x8	Own M	4-4½x5½	BL 21R	U 4 Op Own C	2F R 5.57 54.3 7x2½x3½	
30		SHS 3½		4800	114	161	7900	P40x8	Own SCH	6-4½x4½	Own T	U 4 Op Own C	2F R 5.57 54.3 7x2½x3½	
31		DH 4		4150	150	174	7250	P36x8	Own SD	6-4½x4½	Own T	U 4 Op Own N	2F R 5.57 54.3 7x2½x3½	
32		N 4		4600	191	227	8090	B9.75/20	Own SCH	6-4½x4½	Own T	U 4 Op Own N	2F R 7.20 45.6 6x3x3	
33		NE 5		4725	149	170	8300	B9.75/22	Own SCH	6-4½x4½	Own D	U 4 Op Own C	2F R 5.57 50.1 8x3x3	
34		NF 5		4800	191	227	8350	B9.75/22	Own SCH	6-4½x4½	Own D	U 4 Op Own TF	2F R 7.20 42.4 6x3x3	
35		NH 5		4925	149	170	8440	B9.75/22	Own SCH	6-4½x4½	Own D	U 4 Op Own CG	2F R 5.57 50.1 8x3x3	
36		SE 6		5500	158	168	8800	B9.75/22	Own SCH	6-4½x4½	Own T	U 4 Op Own CG	2F R 5.52 54.0 8x3x3	
37		SE 6		5800	158	168	8950	B10.50/22	Own SCH	6-4½x4½	Own T	U 4 Op Own C	2F R 5.57 54.3 7x2½x3½	
38		C 7½		6600	158	176	10950	B10.50/24	Own SCH	6-4½x4½	BL 734	U 4 Op Wis 78720	2F R 9.12 121 10½x3x3	
39		CE 7½		6000	172	203	10300	S36x7	Own SCH	6-4½x4½	BL 734	U 4 Op Wis 78720	2F R 9.12 121 10½x3x3	
40		CBS 7½		6200	203	208	9800	P42x9	Own SCH	6-4½x4½	BL 734	U 4 Op Wis 78720	2F R 9.12 121 10½x3x3	
41		CF 7½		6900	164	182	11280	B10.50/24	DP10.50/24	Wau GRB	6-5½x5	BL 734	U 4 Op Wis 78720	2F R 7.20 88.5 9x3x3
42		60 2-2½		6000	192	242	9975	B10.50/22	DP10.50/22	Wau GRB	6-5½x5	BL 734	U 4 Op Wis 78720	2F R 7.20 88.6 10½x3x3
43		TE 8½		5300	169	247	10700	B10.50/24	DP10.50/24	Wau GRB	6-5½x5	BL 734	U 4 Op Wis 78720	2F R 7.20 88.6 10½x3x3
44		TF 8½		5800	195	247	10950	B10.50/24	DP10.50/24	Wau GRB	6-5½x5	BL 734	U 4 Op Wis 78720	2F R 7.20 88.6 10½x3x3
45	(T) FE 20			9500	180	180	12300	B10.50/24	DP10.50/24	Ste LT	6-5½x6	BL 734	U 4 Op Wis 78720	2F R 7.20 88.6 10½x3x3
46	Available	W140		1350	168	182	11200	4000	B7.00/20	Wau ZK	6-3½x4½	WG T9	U 4 Op Tim 53200	SF R 6.42 42.0 10x2½x3½
47		W 200	2½-3	1850	168	182	13400	4500	B7.50/20	Wau TL	6-3½x4½	BL 224	U 4 Op Tim 54300	SF R 6.43 45.5 10x2½x3½
48		W 200	2½-3	2075	182	196	16300	5300	B8.25/20	Wau G-90	6-3½x4½	BL 234	U 4 Op Tim 56200	SF R 7.4 47.4 12x2½x3½
49		W 300	3-4	2700	182	196	20700	6000	B9.00/20	Wau G-10	6-4½x4½	BL 524	U 4 Op Tim 58200	SF R 7.8 56.8 12x2½x3½
50		W 400	3½-4	3650	Op	25500	25500	B9.75/20	Wau G-10	6-4½x4½	BL 615	U 5 Op Tim 65720H	WF R 8.5 55.6 7x2½x3½	
51		T43 3½-4		3550	Op	25500	8150	B9.75/20	Wau SRK	6-4½x4½	BL 60	U 4 Op Tim 65720H	WF R 8.5 55.6 7x2½x3½	
52		T45 4		4985	Op	27000	8800	B9.75/20	Wau SRK	6-4½x4½	BL 734	U 4 Op Tim 65720H	WF R 8.5 55.6 7x2½x3½	
53		T50 5		5350	Op	33000	9800	B9.75/20	Wau SRB	6-4½x4½	BL 734	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3	
54	Biederman	10	1-1½	895	130	160	6000	2800	B6.50/18	Con 20A	6-3x4	BL 124	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
55		20	1-1½	1195	145	175	8000	3200	B6.00/20	Con 25A	6-3½x4½	BL 124	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
56		25	1-1½	1250	160	175	10000	3450	B6.50/20	Con 25A	6-3½x4½	BL 124	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
57		30	1-1½	1495	163	178	12000	4100	B7.50/20	Con 25A	6-3½x4½	BL 124	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
58		35	2-3	1850	146	188	12000	4680	B7.50/20	Her JXC	6-3½x4½	BL 234	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
59		40	2-3	2100	158	188	16000	4840	B8.25/20	Her JXC	6-3½x4½	BL 234	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
60		50	2-3	2300	160	178	20000	5600	B9.00/20	Her JXC	6-3½x4½	BL 234	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
61		55	3-5	2750	180	200	20000	6450	B9.00/20	Con E602	6-4½x4½	BL 524	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
62		60	3½-5	3150	170	200	24000	6820	B9.75/20	Con E602	6-4½x4½	BL 524	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
63		70	3½-5	3600	150	210	24000	7530	B9.75/20	Con E602	6-4½x4½	BL 524	U 4 Op Tim 79731	2F R 7.9 96.0 10½x3x3
64		80	5-7	3900	150	210	28000	7800	B10.50/20	Con E				

TRUCK SPECIFICATIONS TABLE

+ FOR MEANING OF ABBREVIATIONS AND EXPLANATION OF REFERENCE MARKS SEE PAGE 56

Line Number	ENGINE DETAILS										Oilng System Type	Governor Make	Fuel Feed	Carburetors Make	Ignition System Make	Generator, Starter Make	Clutch Type and Make	Radiator Make	Universals Make	Make and Model	FRONT AXLE		BRAKES		BODY MOUNTING DATA		SPRINGS									
	Main Bearings		Valve Arrangement		Piston Material		Number and Diameter		Length											Service																
	N.A.C.C. Rated H.P.	Max. Brake H.P. at R.P.M. Given	Camshaft Drive	Camshaft Drive	Piston Material	Piston Material	Number and Diameter	Diameter	Length											Brake Gear Make	Brake Gear Make	Hand Type, Location	Brake Material	Width of Frame	Front	Rear										
1468	4.4	322	43.3	120-2200	H	C	A-4-2%	10%	CC	Ha	Zen	V	DR	P.BBL	DR	27451	Ros	O41A	720A	CD	172	102	33 1/2	42x3	56x4											
2704	4.4	500	60.	175-2200	H	C	A-7-3%	14%	CC	Ha	Zen	M	DR	dPlo	DR	27451	Ros	O41A	720A	CD	172	102	33 1/2	42x3	56x4											
7074	4.4	500	60.	175-2200	H	C	A-7-3%	14%	CC	Ha	Zen	M	DR	dPlo	DR	27451	Ros	O41A	720A	CD	172	102	33 1/2	42x3	56x4											
2448	4.4	500	60.	150-27.3	L	G	C-7-2%	10%	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41H	380G	TX	129 1/2	Opt	31 1/2	40x2 1/2	50x3											
5298	4.4	192	33.7	66-2200	L	G	C-7-2%	13 1/2	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	452G	TX	129 1/2	Opt	31 1/2	40x2 1/2	50x3											
6339	4.4	225	38.4	73-2200	L	G	C-7-2%	13 1/2	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	578G	TX	106	Opt	31 1/2	40x2 1/2	62 1/2x2 1/2											
7339	4.4	225	38.4	73-2200	L	G	C-7-2%	13 1/2	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	658G	TX	106	Opt	31 1/2	40x2 1/2	62 1/2x2 1/2											
8360	4.4	238	40.3	80-2200	L	G	C-7-2%	13 1/2	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	768G	TX	106	Opt	31 1/2	41x2 1/2	62 1/2x2 1/2											
9428	4.4	238	40.3	80-2200	L	G	C-7-2%	13 1/2	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	893G	TX	118	Opt	31 1/2	41x2 1/2	62 1/2x2 1/2											
10478	4.4	315	51.1	103-2200	L	G	C-7-2%	15	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	658G	TX	92 1/2	Opt	31 1/2	41x2 1/2	62 1/2x2 1/2											
11201	4.4	315	51.1	103-2200	L	G	C-7-2%	15	PC	Mo	Zen	AL	AL	P.BBL	DR	27451	Ros	L41HV	452G	TX	92 1/2	Opt	31 1/2	41x2 1/2	62 1/2x2 1/2											
13224	4.4	91	126	64-2500	L	G	C-4-2%	9 1/2	CC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 11710H	Gem	L41H	437p	T	118	66 1/2	34	38x2 1/2	50x2 1/2											
14298	5.0	198	33.7	85-3000	L	G	C-4-2%	10 1/2	CC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 11710H	Ros	L41H	437p	T	118	66 1/2	34	38x2 1/2	50x2 1/2											
15298	5.0	198	33.7	85-3000	L	G	C-4-2%	10 1/2	CC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000H	Ros	L41H	450p	T	149	92	34	38x2 1/2	50x2 1/2											
16339	4.6	212	38.4	85-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000H	Ros	L41H	540p	T	172	105	34	39x2 1/2	56x3											
17298	5.0	212	38.4	85-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 14703H	Ros	L41HV	275p	T	173	106	34	41 1/2x3	54x3 1/2											
18339	4.6	212	38.4	85-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 35000H	Ros	L41H	657p	T	197	119	34	39x2 1/2	56x3											
19381	4.6	212	38.4	85-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 35000H	Ros	L41H	765p	T	221	132	34	40x3	56x3											
20381	4.6	212	38.4	85-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 15302	Ros	T21MV	500p	T	169 1/2	103 1/2	34	41 1/2x3	54x3 1/2											
21428	4.9	268	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 26450H	Ros	L41H	864p	T	123	134	34	40x3	56x3											
22314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
23314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
24314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
25314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
26314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
27314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
28314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
29314	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
30404	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
31404	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
32404	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
33404	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
34404	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
35453	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
36404	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
37453	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
38453	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
39453	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
40453	5.2	212	38.4	101-2400	L	G	C-7-2%	13 1/2	PC	Ha	Zen	DR	DR	P.BBL	Fe	Tim 31000	Ros	L41D	450p	T	124 1/2	124 1/2	34	40x2 1/2	54x3											
41677	4.6	462	60.	126-1800	L	G	C-7-3	11 1/2	CC	PC	Wa	Str	DR	P.BBL	GO	Tim 26450	Ros	L41H	26450	TX	124 1/2	124 1/2	34	41x2 1/2	53x3											
42453	4.6	462	60.</																																	

Line Number	MAKE AND MODEL	GENERAL (See Keynote)				TIRE SIZE		MAJOR UNITS.				FRAME					
		Tonnage Rating	Chassis Price	Standard Wheelbase	Max. W. B. Furnished	Gross Vehicle Weight	Chassis Wt. (Stripped)	Front	Rear	Engine	Transmission						
										Make and Model	No. of Cylinders Bore and Stroke	Make and Model	Location and Forward Speeds Aux. Location and Speeds	Make and Model	Gear and Type	Drive and Torque	Gear Ratios
1	Corbitt (T) 12B6T	4-7	3465 (3) (3)	23900	4870	B8.25/20	DB8.25/20	Con E602	6-4 1/4x4 1/2	BL 335	U 4	Tim 56200H	SF	H Op	Op	7x3 1/2x1 1/2	T
2	(T) 15B6T	5-8	4875 (3) (3)	30400	5870	B9.00/20	DB9.00/20	Con E603	6-4 1/4x4 1/2	BL 335	U 5	Tim 58200H	SF	H Op	Op	7x3 1/2x1 1/2	T
3	(T) 18D6T	8-10	5500 (3) (3)	36200	8100	B9.75/20	DB9.75/20	Con 22R	6-4 1/4x5 1/2	BL 535	U 5	Tim 75720H	2F	H Op	Op	8x3 1/2x1 1/2	C
4	(T) 24D6T	10-15	6500 (3) (3)	50600	9200	B10.50/20	DB10.50/20	Con 16L	6-4 1/4x5 1/2	BL 7212	U 4	Tim 66720W	2F	H Op	Op	8x3 1/2x1 1/2	C
5	Dart	30G 1 1/2-2	1595 150 180	11200	4900	B6.60/20	DB6.60/20	Her WXA2	6-3 1/4x4 1/2	Fu MLU	U 4	Tim 53200W	BF	H 5.14	32.6	6x3x1 1/2	P
6		40G 2	2195 150 180	13400	5650	B7.50/20	DB7.50/20	Her WXB	6-3 1/4x4 1/2	Fu MLU	U 4	Tim 54200	BF	H 6.8	34.9	7x3x1 1/2	P
7		50G 2 1/2-3	2725 150 180	16300	5750	B7.50/20	DB8.25/20	Her WCX2	6-4 1/4x4 1/2	Fu MLU	U 4	Tim 56200	BF	H 6.16	31.6	7x3x1 1/2	P
8		60G 3	3250 166 208	20700	7425	B8.25/20	DB9.00/20	Her YXC2	6-4 1/4x4 1/2	Fu JYUOG	U 5	Tim 58200	WF	H 6.8	48.4	7x3x1 1/2	P
9		80W 4	4450 170 220	25600	8500	B8.25/20	DB9.75/20	Her YXC2	6-4 1/4x4 1/2	Fu VUOG	U 5	Tim 65720	WF	H 6.8	40.7	7x3x1 1/2	P
10		100W 5	5500 170 235	33600	10500	B9.75/20	DB9.75/20	Her RXC	6-4 1/4x5 1/2	Fu MUH	U 4	A 3 Tim 66720	WF	H 6.8	48.8	7x3x1 1/2	P
11		150W 7 1/2	6500 170 245	46100	11500	B9.75/20	DB10.50/20	Her HXB	6-5x6	BL 735	U 5	Tim 68720	WF	H 6.8	42.7	7x3x1 1/2	P
12		200W 10	8500 180 250	40400	12500	B9.75/20	DB10.50/20	Her HXB	6-5x6	BL 735	U 5	Tim SW310	WF	H 6.8	42.7	7x3x1 1/2	P
13	(4 Whl. Dr.)	60 4	5750 180 200	19000	8700	B9.00/20	DB9.00/20	Her WXC3	6-4 1/4x4 1/2	Fu JYUOG	U 5	A 2 Wis 69317B	DF	H 8.4	153	7x3x1 1/2	P
14	(4 Whl. Dr.)	80 6	6800 180 225	24000	11000	B9.75/20	DB9.75/20	Her RXC	6-4 1/4x4 1/2	Fu VUOG	U 5	A 2 Wis 1237	DF	H 8.0	152	9x3 1/2x1 1/2	P
15	Diamond T	210SF 1 1/2	545 135 158	8500	3100	B5.50/20	DB5.50/20	Her JXA	6-3 1/4x4 1/2	Co 364	S 1/2	H 5.4	36	7x2 1/2x1 1/2	T		
16		210F 1 1/2	565 135 158	8500	3100	B5.50/20	DB5.50/20	Her JXA	6-3 1/4x4 1/2	Co 364	S 1/2	H Opt	Opt	7x2 1/2x1 1/2	T		
17		240A 2	795 137 167	10000	3500	B6.00/20	P32x6	Her JXA	6-3 1/4x4 1/2	Co 410	S 1/2	H Opt	Opt	7x3x1 1/2	T		
18		310 2	995 150 179	12000	4200	B6.50/20	DB6.50/20	Her JXB	6-3 1/4x4 1/2	Co 613	S 1/2	H Opt	Opt	7x3x1 1/2	T		
19		350 2	1295 165 190	14000	4700	B7.00/20	DB7.00/20	Her JXC	6-3 1/4x4 1/2	Co 10103	S 1/2	H Opt	Opt	7x3x1 1/2	T		
20		410A 2	1695 160 194	15000	5400	B7.50/20	DB7.50/20	Her WXC	6-4 1/4x4 1/2	Co W5B	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
21		410B 2	2135 200 200	15000	6200	B7.50/20	DB7.50/20	Her WXC	6-4 1/4x4 1/2	Co RUS4C	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
22		504A 3	2650 166 208	17500	6420	B8.25/20	DB8.25/20	Her WXC	6-4 1/4x4 1/2	Co RUS4C	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
23		(N) 506A 3	2950 174 240	17500	6600	B8.25/20	DB8.25/20	Her WXC3	6-4 1/4x4 1/2	Co RUS4C	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
24		603 2 1/2	3395 169 230	20000	7500	B9.00/20	DB9.00/20	Her YXC	6-4 1/4x4 1/2	Co RUS4C	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
25		(N) 606B 2 1/2	3695 179 246	20000	7500	B9.00/20	DB9.00/20	Her RXB	6-4 1/4x5 1/2	Co RUS4C	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
26		510 2	1995 168 201	18000	6000	B7.50/20	DB7.50/20	Her WXC	6-4 1/4x4 1/2	Co RUS4C	S 1/2	H Opt	Opt	6x4 3/4x1 1/2	P		
27		750 4-5	4925 178 238	24000	9300	B9.75/22	DB9.75/22	Her RXC	6-4 1/4x5 1/2	Co SA5	S 1/2	H Opt	Opt	7x3 1/2x1 1/2	T		
28	Differential	E-131	3200 160 160	18100	5100	B9.00/20	DB9.00/20	(5) Lyc ASD	6-3 1/4x4 1/2	BL 314	S 1/2	H Opt	Opt	7x3 1/2x1 1/2	T		
29	Dodge Bros.	UF-10	375 109 109	4025	1025	B5.00/19	P5.00/19	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
30		445 109 109	125	1975	55.25/19	B5.25/19	DB5.25/19	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
31		525 109 109	125	1975	55.25/19	B5.25/19	DB5.25/19	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
32		595 124 124	4900	124	4760	2260	B6.00/20	DB6.00/20	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C	
33		595 124 124	4860	2360	B6.00/20	DB6.00/20	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C			
34		UG20 2 1/2	531 131 157	5900	2450	B7.50/17	DB7.50/17	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
35		G20 2 1/2	597 131 157	5975	2520	B7.50/17	DB7.50/17	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
36		1-1 1/2	495 133 133	5840	2590	B6.00/20	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
37		595 133 133	5940	2690	B6.00/20	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C			
38		UG-12 2	525 131 157	8200	2490	B6.00/20	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
39		G30 2	585 131 157	8275	2560	B6.00/20	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
40		UF-30 1 1/2-2	595 136 165	8225	2581	B6.00/20	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
41		F-30 1 1/2-2	695 136 165	8275	2631	B6.00/20	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
42		F-35 1 1/2-2	1425 140 165	10175	3780	B6.00/20	DB6.00/20	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
43		G43 2 1/2	795 136 165	10500	3345	B7.00/20	DB7.00/20	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C		
44		F-40 2 1/2-3	1515 135 185	12250	4235	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C			
45		(5) F-61 3 1/2-5	1750 170 195	19429	5789	P32x6	Own	4-3 1/4x4 1/2	Own	S 1/2	H 4.66	13.9	9x1 1/2x1 1/2	C			
46		(5) G-82 4 7 1/2	5350 195 220	25000	8040	B9.75/20	DB9.75/20	Own	8-3 1/4x5	WG 7	S 1/2	H 7.21	69.6	10x3 1/2x1 1/2	G		
47	Douglas	A6 1	1095 135 145	7500	3075	P30x5	Con J214	6-3 1/4x4 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
48		B4 1 1/2	2050 150 150	9000	3950	P30x5	Con P32x6	6-3 1/4x4 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
49		B6 1 1/2	2150 150 150	10500	4100	P30x5	Con P32x6	6-3 1/4x4 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
50		C4 2	3275 156 156	12500	5100	P32x6	Con P34x7	6-4 1/4x5 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
51		C6 2	3425 168 168	15500	5850	P32x6	Con P34x7	6-4 1/4x5 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
52		CD4 2 1/2	3855 190 190	17500	5860	P34x7	Con P36x8	6-4 1/4x5 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
53		CD6 2 1/2	3955 190 190	17500	5800	P34x7	Con P36x8	6-4 1/4x5 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
54		D4 3	4010 186 186	20000	6500	S36x5*	Con P36x7	6-4 1/4x5 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
55		D6 3	4430 186 186	20000	6800	P36x6	Con P38x7	6-4 1/4x5 1/2	WU 7	S 1/2	H 5.6	36.3	5x1 1/2x1 1/2	T			
56		D6 5p 3	5500 216 208	22000	7560	P38x7	Con P40x8	6-4 1/4x5 1/2	WU 7	S							

Line Number	MAKE AND MODEL	GENERAL (See Keynote)				TIRE SIZE		MAJOR UNITS						FRAME Type						
		Tonnage Rating	Chassis Price	Standard Wheelbase	Max. W. B. Furnished	Gross Vehicle Weight		Front	Rear	ENGINE		TRANSMISSION		REAR AXLE						
						Chassis Wt. (Stripped)				No. of Cylinders Bore and Stroke	Make and Model	Location and Forward Speeds	Aux. Location and Speeds	Make and Model	Gear and Type	Drive and Torque	Gear Ratios			
1	Garford (concluded)	60Z ^{3-1/2}	4880	175	192	18000	7100	P36x6	D38x7	Bud BA6	6-4 1/2 x 5 1/8	Fu VU	U 5	Tim 65706	WF	R 8.5	S 63	Tx3 1/2 x 1/4	PP	
2	General Mot. (6)	80Z ^{4-1/2}	5330	175	192	24000	8400	S36x6	S36x14	Bud BA6	6-4 1/2 x 5 1/8	Fu VU	U 7	Tim 66700	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
3		100Z ^{5-1/2}	5830	175	192	30000	9600	S36x6	S10x14	Bud BA6	6-4 1/2 x 5 1/8	Fu VU	U 7	Tim 68700	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
4		T15 ^{1 1/2 - 1 1/2}	645	130	141	6500	2625	B5.50/20	P25x6	Own 200	6-3 1/2 x 3 1/8	Fu VU	U 5	Tim 64835	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
5		T18 ^{1 1/2 - 2}	675	131	157	8200	2785	P30x3	P22x6	Own 200	6-3 1/2 x 3 1/8	Fu VU	U 5	Tim 64835	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
6		T19 ^{1 1/2 - 2}	745	130	164	10000	3375	B6.00/20	B7.50/20	Buick	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
7		T25 ^{2-1/2}	1200	130	152	9000	3080	B6.50/20	DB6.50/20	Own 200	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
8		T23 ^{2-1/2}	745	131	157	10000	3420	B6.50/20	DB6.50/20	Own 221	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
9		T23 ^{2-1/2}	795	131	166	10500	5095	P34x7	P34x7	Buick	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
10		T26 ^{2-1/2}	1210	130	164	11000	3685	B6.50/20	B8.25/20	Own 257	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
11		T30 ²⁻³	1545	141	181	12500	4490	P30x5	P30x5	Buick	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
12		T31 ²⁻³	1695	141	181	14000	4695	P32x6	P32x6	Own 257	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
13		T33 ²⁻³	1225	142	184	13000	4415	P32x6	P32x6	Own 257	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
14		T42 ²⁻³	1845	141	181	15000	4725	P32x6	P32x6	Buick	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
15		T43 ²⁻³	1525	142	184	16000	4935	P32x6	P32x6	Own 257	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
16		T44 ³⁻⁴	2065	141	181	16000	5095	P34x7	P34x7	Buick	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
17		T45 ³⁻⁴	1865	141	181	16000	4910	P32x6	P32x6	Own 257	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
18		T51 ⁴⁻⁵	2480	155	200	19000	6090	P34x7	P34x7	Own 331	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
19		T51H ⁵⁻⁶	2800	154	200	22000	6910	P34x7	P34x7	Own 331	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
20		T60 ⁵⁻⁶	3035	154	200	22000	6925	P34x7	P34x7	Buick	6-3 1/2 x 3 1/8	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
21		T61 ⁵⁻⁶	3710	154	200	22000	7380	B9.00/20	B9.00/20	Own 400	6-4 1/2 x 5	Fu VU	U 4	Op Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
22		T82 ⁵⁻⁷	3795	155	201	24000	7500	B9.00/20	DB9.00/20	Own 331	6-3 1/2 x 5	Fu VU	U 4	A 3 Own	WF	R 10.5	S 98	Tx3 1/2 x 1/4	PP	
23		T83 ^{6-7 1/2}	4205	155	201	25000	7765	B9.00/20	DB9.00/20	Own 400	6-4 1/2 x 5	Fu VU	U 5	Op Own	WF	R 9.0	74	Tx3 1/2 x 1/4	PP	
24		T85 ⁵⁻⁸	5600	171	204	30000	10630	B9.75/20	DB9.75/20	Own 525	6-4 1/2 x 5	Fu VU	U 4	Op Own	WF	R 8.5	53	Tx3 1/2 x 1/4	PP	
25		T85H ^{8-9 1/2}	6195	171	204	34000	11060	B9.75/20	DB9.75/20	Own 525	6-4 1/2 x 5	Fu VU	U 4	Op Own	WF	R 9.0	53	Tx3 1/2 x 1/4	PP	
26		T110 ¹⁰⁻¹²	8110	171	204	40000	12800	B10.50/24	DB10.50/24	Own 616	6-4 1/2 x 5	Fu VU	U 4	A 3 Own	WF	R 9.0	116	Tx3 1/2 x 1/4	LL	
27	Gramm	AX4 ^{1-1 1/2}	795	131	157	8000	3350	B6.50/20	Con W10	Con 16C	4-3 1/2 x 4	WG TA	U 4	Op Tim	53200H	BF	R 15.5	66	36 x 2 1/2 x 1/4	CC
28		AX6 ^{1-1 1/2}	895	131	157	8000	3550	B6.50/20	Con 25A	Con 16C	4-3 1/2 x 4	WG TA	U 4	Op Tim	53200H	BF	R 15.5	66	36 x 2 1/2 x 1/4	CC
29		BX4 ^{1-1 1/2}	895	131	210	10000	3525	B6.00/20	DB6.00/20	Con 10	4-3 1/2 x 4	WG TA	U 4	Op Tim	53200H	BF	R 15.5	66	36 x 2 1/2 x 1/4	CC
30		BX6 ^{1-1 1/2}	995	131	210	10000	3725	B6.00/20	DB6.00/20	Con 25A	4-3 1/2 x 4	WG TA	U 4	Op Tim	53200H	BF	R 15.5	66	36 x 2 1/2 x 1/4	CC
31		BXF ^{1-1 1/2}	1495	131	210	10000	4000	B6.00/20	DB6.00/20	Lyc ASD	6-3 1/2 x 4	BL 314	U 4	Op Tim	53200H	BF	R 15.5	66	36 x 2 1/2 x 1/4	CC
32		B ^{2-2 1/2}	1295	140	196	12000	4150	B6.50/20	DB6.50/20	Lyc 4SL	6-3 1/2 x 4	BL 314	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
33		BF ^{2-2 1/2}	1695	140	210	12000	4300	B6.50/20	DB6.50/20	C A 4J	6-3 1/2 x 4	BL 314	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
34		CF ^{2-2 1/2}	1095	131	210	12000	3950	B6.50/20	DB6.50/20	C n W20	6-3 1/2 x 4	BL 314	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
35		CG ^{2-2 1/2}	1345	131	210	13000	4300	B6.50/20	DB6.50/20	Cum Dle	6-3 1/2 x 4	WG TA	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
36		CXH ^{2-2 1/2}	1345	131	210	13000	4300	B6.50/20	DB6.50/20	Her JXC	6-3 1/2 x 4	BL 314	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
37		CF ^{2-3 1/2}	1895	160	224	14000	4900	B7.50/20	DB7.50/20	Lyc ASD	6-3 1/2 x 4	BL 314	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
38		CXF ^{2-3 1/2}	1935	160	224	14000	5100	B7.50/20	DB7.50/20	Con 20	6-3 1/2 x 4	BL 314	U 4	Op Tim	54200H	BF	R 15.5	83	37 x 2 1/2 x 1/4	CC
39		D ^{2-3 1/2}	1995	160	224	17000	5100	B7.50/20	DB7.50/20	Lyc ASD	6-3 1/2 x 4	BL 314	U 4	Op Tim	56200H	BF	R 16.5	39	37 x 2 1/2 x 1/4	CC
40		DF ^{2-3 1/2}	2695	160	260	17000	5300	B7.50/20	DB7.50/20	Con 21R	6-3 1/2 x 4	BL 314	U 4	Op Tim	56200H	BF	R 16.5	39	37 x 2 1/2 x 1/4	CC
41		EX ⁴⁻⁴	2295	160	224	16300	5200	B8.25/20	DB8.25/20	E601	6-3 1/2 x 4	BL 324	U 4	Op Tim	56200H	BF	R 16.5	39	37 x 2 1/2 x 1/4	CC
42		ED ^{3-4 1/2}	2595	160	224	20000	5950	B8.25/20	DB8.25/20	Ly T8	6-3 1/2 x 5	BL 324	U 4	Op Tim	58200H	BF	R 15.5	36	37 x 2 1/2 x 1/4	CC
43		ED ^{3-4 1/2}	3995	160	224	20000	6100	B8.25/20	DB8.25/20	Cum Dle	6-3 1/2 x 5	WG TA	U 4	Op Tim	58200H	BF	R 15.5	36	37 x 2 1/2 x 1/4	CC
44		EY190 ^{3-4 1/2}	3595	190	190	16000	6750	B7.50/20	DB7.50/20	Con 20R	6-3 1/2 x 4	Co Rus4	U 4	Op Tim	58200H	BF	R 15.5	36	37 x 2 1/2 x 1/4	CC
45		GY ⁴⁻⁶	4345	190	210	18000	7700	B8.25/20	DB8.25/20	Con 21R	6-3 1/2 x 4	Co Rus4	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
46		G ⁴⁻⁶	3695	150	225	24000	7950	B9.00/20	DB9.00/20	Con 21R	6-3 1/2 x 4	Co Rus4	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
47		GF ⁴⁻⁶	5500	150	225	24000	9050	B9.75/20	DB9.75/20	Her HXC	6-3 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
48		GW ^{5-7 1/2}	5175	157	240	25000	9500	B9.00/20	DB9.00/20	Her HXC	6-3 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
49		GWD ^{5-7 1/2}	6495	157	240	30000	10000	B9.00/20	DB9.00/20	Con 18R	6-4 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
50		HY ^{5-7 1/2}	6585	210	236	22000	7000	B8.25/20	DB8.25/20	Con 18R	6-4 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
51		H ^{5-7 1/2}	1505	140	162	7000	3735	P32x6	P32x6	Con 18E	6-3 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
52	Hahn-Selden	T17 ^{1 1/2 - 2}	1505	140	162	7000	3900	P32x6	P32x6	Con 16C	6-3 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
53	G.-P.	T31 ^{1 1/2 - 2}	1020	140	162	7000	3900	P32x6	P32x6	Con 16C	6-3 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
54		T31 ^{1 1/2 - 2}	1220	140	162	7000	3900	P32x6	P32x6	Con 16C	6-3 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
55		T31 ^{1 1/2 - 2}	1935	151	181	10000	4800	P32x6	P32x6	Con 16R	6-4 1/2 x 4	BL 314	U 4	Op Tim	60317H	BF	R 16.5	37	37 x 2 1/2 x 1/4	CC
56		T31 ^{1 1/2 - 2}	2290	151	181	13000														

Line Number	ENGINE DETAILS										Governor Make	Fuel System Type	Fuel Feed	Electrical	Front Axle	Brakes	Body Mounting Data	Springs								
	Piston Displacement	Compression Ratio	Max. Brake H.P. at R.P.M. Given	N.A.C.C. Rated H.P.	Valve Arrangement	Camshaft Drive	Piston Material	Main Bearings	Number and Diameter	Length																
	Torque lb. ft.																									
1410	4.5	270	40.8	83-2100	L	G	C	4-2	1/2" x 1/2"	9 1/2	PC	Bu	Zen	V	AL	AL	D.Fu	Tim 35000H	Ha L41H	584 a	FX 156	97 1/2	34	42x2 1/2	54x3	
2411	4.5	270	40.8	83-2100	L	G	C	4-2	1/2" x 1/2"	9 1/2	PC	Bu	Zen	V	AL	AL	D.Ow	Tim 26450H	Ros L41H	618 a	FX 144	94 1/2	34	42x3	56x3	
3411	4.5	270	40.8	83-2100	L	G	C	3-2	1/2" x 1/2"	5 1/2	CC	Bu	Zen	V	AL	AL	D.Ow	Tim 27450H	Ros L41H	568 a	FX 144	94 1/2	34	42x3	56x4	
4200	4.9	127	26.3	60-3000	L	G	B	3-2	1/2" x 1/2"	5 1/2	CC	Opt	Zen	Ma	DR	DR	P.Ow	Lo MM	Jac B41M	211 p	41	87	48	34	38x2	50 1/2 x 2 1/2
5200	5.1	132	26.3	66-3200	L	G	B	3-2	1/2" x 1/2"	5 1/2	CC	Opt	Zen	Ma	DR	DR	P.Ow	Lo Own	Jac O41M	186 p	2L	85%	50 1/2	37	36x1 1/2	45x2 1/2
6221	4.6	155	24.3	69-2800	H	G	B	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	290 a	TX	87	48	34	38x2	50 1/2 x 2 1/2	
7200	5.1	133	26.3	66-3200	H	G	C	3-2	1/2" x 1/2"	8 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	239 p	TX	87	48	34	38x2	50 1/2 x 2 1/2	
8257	4.5	185	28.3	76-2500	H	G	C	3-2	1/2" x 1/2"	8 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	175 p	2L	85%	50 1/2	37	36x1 1/2	45x2 1/2	
9200	5.1	133	26.3	66-3200	H	G	C	4-2	1/2" x 1/2"	8 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	186 p	2L	85%	50 1/2	37	36x1 1/2	45x2 1/2	
10221	4.6	155	24.3	69-2800	H	G	B	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	290 a	TX	87	48	34	38x2	50 1/2 x 2 1/2	
11257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	8 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	288 a	TX	107	59	34	38x2	50 1/2 x 2 1/2	
12257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	8 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	345 a	TX	107	59	34	38x2	50 1/2 x 2 1/2	
13257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	8 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	288 a	TX	107	59	34	38x2	50 1/2 x 2 1/2	
14257	4.5	185	28.3	76-2500	H	G	B	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	328 a	TX	107	60	34	38x2	50 1/2 x 2 1/2	
15257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	320 a	TX	107	59	34	38x2	50 1/2 x 2 1/2	
16257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	345 a	TX	107	60	34	38x2	50 1/2 x 2 1/2	
17257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	320 a	TX	107	59	34	38x2	50 1/2 x 2 1/2	
18257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	345 a	TX	107	60	34	38x2	50 1/2 x 2 1/2	
19257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	379 a	TX	125	70	34	38x2	50 1/2 x 2 1/2	
20257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	379 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
21257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
22257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
23257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
24257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
25257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
26257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
27257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
28257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
29257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
30257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
31257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
32257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
33257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
34257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
35257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
36257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
37257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
38257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
39257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
40257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
41257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
42257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3	50 1/2 x 2 1/2	
43257	4.5	185	28.3	76-2500	H	G	C	4-2	1/2" x 1/2"	7 1/2	PC	Ha	Ma	DR	DR	P.Ow	Lo Opt	Jac O41M	418 a	TX	125	69 1/2	34	40x3		

Line Number	MAKE AND MODEL	GENERAL (See Keynote)				TIRE SIZE		MAJOR UNITS				FRAME		
		Tonnage Rating	Chassis Price	Standard Wheebase	Max. W. B. Furnished	Gross Vehicle Weight	Chassis Wt. (Stripped)	Front	Rear	ENGINE	TRANSMISSION	REAR AXLE		
										Make and Model	No. of Cylinders Bore and Stroke	Location and Forward Speeds	GEAR RATIOS	
1	La Fr. Republic E-3 (con'd.)	3-3-1/2	2420	174	198	16000	5625	P34x7	DBP34x7	Lyc ASD	6-3 1/2 x 4 1/2	Fu MGU14	U 4 No Tim 58200H SF R 7.8 In High	
2		H-4	3285	179	206	19500	7300	B9.75/20	DP9 75/20	Ley TS	6-3 1/2 x 4	Fu MRU	U 4 No Tim 75720H 2F R 8.15 In Low	
3		M-3	4640	174	198	23000	8300	B10.50/20	DB10.50/20	Wau 6SRL	6-4 1/2 x 5 1/2	Fu VUOG	U 4 No Tim 76733H 2F R 8.85 In High	
4		35-1	6570	174	198	30000	9250	B10.50/24	DB10.50/24	Wau 6-125	6-4 1/2 x 5 1/2	Fu MUH	U 4 No Tim 76737H 2F R 8.90 In Low	
5	Le Moon	150	112	1150	140	152	8000	3300	B6.50/20	B6.50/20	Con 16C	6-3 1/2 x 4 1/2	Fu BL 214	U 4 No Tim 53200H BF H 5.14 In High
6		200	124	1350	160	173	11200	3600	B7.00/20	DB7.00/20	Con 16C	6-3 1/2 x 4 1/2	Fu BL 214	U 4 No Tim 53200H BF H 5.14 In Low
7		300	124	1350	163	170	12600	4200	B7.50/20	DB7.50/20	Con 16C	6-3 1/2 x 4 1/2	Fu BL 214	U 4 No Tim 53200H BF H 5.14 In High
8		400	3-4	2175	163	190	15300	5000	B8.25/20	DB8.25/20	Wau 6MS	6-3 1/2 x 4 1/2	Fu BL 314	U 4 No Tim 56200H BF R 6.16 In High
9		500	4-5	2775	160	190	19500	6000	B9.00/20	DB9.00/20	Wau 6MS	6-4 1/2 x 4 1/2	Fu BL 514	U 4 No Tim 58200H BF R 6.14 In Low
10		600	5-6	3450	169	199	21600	7200	B9.75/20	DB9.75/20	Wau 6SRL	6-4 1/2 x 5 1/2	Fu VUOG	U 5 No Tim 58200H WF R 6.00 In High
11	Maccaur.	100	1 1/2 - 2	1330	151	181	10000	4165	B6.50/20	DB6.50/20	Bud H260	6-3 1/2 x 4 1/2	Fu BL 298	U 4 No Tim 56200H BF H 5.6 In High
12		40A	2 1/2 - 4	2400	155	183	15000	5350	B7.50/20	DB7.50/20	Bud H298	6-3 1/2 x 4 1/2	Fu BL 314	U 4 No Tim 56200H BF H 5.6 In Low
13		180	3-5	3500	181	213	18000	7400	B9.00/20	DB9.00/20	Kud 293	6-4 1/2 x 4 1/2	Fu BL 554	U 4 No Tim 58200H 2F R 6.4 In High
14		60A	4-6	4500	183	207	22000	7300	B9.75/20	DB9.75/20	Bud BAR	6-4 1/2 x 4 1/2	Fu BL 554	U 4 No Tim 58200H 2F R 6.4 In Low
15		65A	4-6	5500	184	235	22000	8200	B9.75/20	DB9.75/20	Her YXC3	6-4 1/2 x 5 1/2	Fu BL 615	U 5 No Tim 65720H WF R 6.8 In High
16		220H	4-6	4500	181	230	22000	8750	B9.75/20	DB9.75/20	Wau 6SRK	6-4 1/2 x 5 1/2	Fu BL 615	U 5 No Tim 65720H WF R 6.8 In Low
17		220W	4-6	5000	180	230	22000	8750	B9.75/20	DB9.75/20	Wau 6SRK	6-4 1/2 x 5 1/2	Fu BL 615	U 5 No Tim 65720H WF R 6.8 In High
18		86A	5-8	5950	184	235	30000	9500	B10.50/20	DB10.50/20	Wau 6SRK	6-4 1/2 x 5 1/2	Fu BL 615	U 5 No Tim 65720H WF R 6.8 In Low
19	Mack.	BL 1-2	2500	138	148	9500	4050	B6.00/20	DB6.00/20	Own BL	6-3 1/2 x 4	Fu BL 615	U 4 No Tim 52000B2 SF R 6.6 In High	
20		BL 1 1/2 - 3	3000	138	192	12000	4800	P32x6	DP32x6	Own BG	6-3 1/2 x 5	Fu BG	U 4 No Tim 52000B2 SF R 6.4 In Low	
21		BL 2 1/2 - 4	4200	156	198	16000	6600	B8.25/20	DB8.25/20	Own BG	6-3 1/2 x 5	Fu BG	U 4 No Tim 52000B2 SF R 6.4 In High	
22		AB 3-5	4000	147	219	17500	6450	P34x7	DP34x7	Own AB	4-4 1/2 x 5	Fu AB	U 4 No Tim 52000B2 SF R 6.4 In Low	
23		AB 3-5	4200	147	219	17500	6700	P34x7	DP34x7	Own AB	4-4 1/2 x 5	Fu AB	U 4 No Tim 52000B2 SF R 6.4 In High	
24		AB 3-5	4150	147	219	17500	6450	P34x7	DP34x7	Own AB	4-4 1/2 x 5	Fu AB	U 4 No Tim 52000B2 SF R 6.4 In Low	
25		AB 3-5	4500	147	219	17500	6700	P34x7	DP34x7	Own AB	4-4 1/2 x 5	Fu AB	U 4 No Tim 52000B2 SF R 6.4 In High	
26		BM 3-5	4700	157	217	21500	7500	B9.00/20	DB9.00/20	Own BC	6-4 1/2 x 5 1/2	Fu BC	U 4 No Tim 52000B2 SF R 6.4 In Low	
27		BC 4-6	5250	154	226	23500	7850	P36x8	DP36x8	Own BC	6-4 1/2 x 5 1/2	Fu BC	U 4 No Tim 52000B2 SF R 6.4 In High	
28		BC 4-6	5500	154	226	23500	8000	P36x8	DP36x8	Own BC	6-4 1/2 x 5 1/2	Fu BC	U 4 No Tim 52000B2 SF R 6.4 In Low	
29		BX 4-6	5750	160	214	24800	7900	B9.75/22	DB9.75/22	Own BX	6-4 1/2 x 5 1/2	Fu BX	U 4 No Tim 52000B2 SF R 6.4 In High	
30		BX 4-6	5600	160	214	24700	8050	B9.75/22	DB9.75/22	Own BX	6-4 1/2 x 5 1/2	Fu BX	U 4 No Tim 52000B2 SF R 6.4 In Low	
31		BJ 5-8	6450	168	243	31500	9800	B10.50/22	DB10.50/22	Own BK	6-4 1/2 x 5 1/2	Fu BK	U 4 No Tim 52000B2 SF R 6.4 In High	
32		BQ 5-8	6800	191	245	32600	10000	B10.50/22	DB10.50/22	Own BK	6-4 1/2 x 5 1/2	Fu BK	U 4 No Tim 52000B2 SF R 6.4 In Low	
33		AK 5-8	5130	162	228	28500	9500	B10.50/24	DB10.50/24	Own AC	4-5x6	Fu AC	U 4 No Tim 52000B2 CD R 7.52 In High	
34		AK 5-8	5230	162	228	28500	9400	B10.50/24	DB10.50/24	Own AC	4-5x6	Fu AC	U 4 No Tim 52000B2 CD R 7.52 In Low	
35		AK 5-8	6430	174	240	32500	10400	B10.50/22	DB10.50/22	Own AC	4-5x6	Fu AC	U 4 No Tim 52000B2 CD R 7.52 In High	
36		BX-S 7-1	6250	207	225	26000	9200	B9.75/24	DB9.75/24	Own BX	6-4 1/2 x 5 1/2	Fu BX	U 4 No Tim 52000B2 CD R 7.52 In Low	
37		AC Light 5-8	4950	168	240	28000	9300	B10.50/24	DB10.50/24	Own AC	4-5x6	Fu AC	U 4 No Tim 52000B2 CD R 7.52 In High	
38		AC Medium 6-9	5500	168	240	32000	9800	S36x8	D40x6	Own AC	4-5x6	Fu AC	U 4 No Tim 52000B2 CD R 7.52 In Low	
39		AC Heavy 7-10	6000	168	240	37000	10150	S36x7	D40x7	Own AP	4-5x6	Fu AP	U 4 No Tim 52000B2 CD R 7.52 In High	
40		A 6-9	6450	74	240	28500	11400	B10.50/24	DB10.50/24	Own AP	4-5x6	Fu AP	U 4 No Tim 52000B2 CD R 7.52 In Low	
41		AF 7-10	8500	191	241	36500	17000	S36x7	D40x8	Own AP	4-5x6	Fu AP	U 4 No Tim 52000B2 CD R 7.52 In High	
42	Mar.-Herr.	TL 2-1	3785	135	12000	5500	B7.50/20	DB7.50/20	Her JJC	6-3 1/2 x 4 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In High		
43	(All 4 Wh. Dr.)	TL 2-2	4285	158	188	12500	7250	B8.25/20	DB8.25/20	Her WXC	6-4 1/2 x 5 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In Low	
44		TL 2-2	4950	158	188	17200	7700	B8.25/22	DB8.25/22	Her WXC	6-4 1/2 x 5 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In High	
45		TL 30	5485	158	188	19370	8370	B8.25/20	DB8.25/20	Her WXC3	6-4 1/2 x 4 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In Low	
46		TH-300	6255	163	193	20300	9300	B9.75/20	DB9.75/20	Her YXC	6-4 1/2 x 5 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In High	
47		TH-310	6785	163	193	23630	9620	B9.75/20	DB9.75/20	Her YXC3	6-4 1/2 x 5 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In Low	
48		TH-310A	7785	163	193	25120	10120	B9.75/22	DB9.75/22	Her RNC	6-4 1/2 x 5 1/2	Fu BL 328	U 4 No Tim 52000B2 SF R 6.4 In High	
49		TH-320	10500	198	228	31200	14200	B10.50/22	DB10.50/22	Her HXD	6-5 1/2 x 6	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In Low	
50		TH-330	1250	198	228	33920	14920	B11.25/24	DB11.25/24	Her HXD	6-5 1/2 x 6	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In High	
51		RR-10	1195	159	Op	10000	4195	B6.50/20	DB6.50/20	Her JJC	6-3 1/2 x 4 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In Low	
52	Moreland.	RR-12	1400	159	Op	12000	4585	P32x6	DP32x6	Her JXC	6-3 1/2 x 4 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In High	
53		B13	15	2 1/2 - 3 1/2	2850	184	15000	5815	B8.25/20	DB8.25/20	Her WXC	6-4 1/2 x 5 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In Low
54		B16	18	4-1/2 - 5 1/2	30251	184	18000	6195	B9.00/20	DB9.00/20	Her WXC	6-4 1/2 x 5 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In High
55		E16	18	4-1/2 - 5 1/2	3300	184	18000	6460	B9.00/20	DB9.00/20	Her WXC	6-4 1/2 x 5 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In Low
56		E19	21	5-1/2 - 6	3800	184	21000	7155	B9.75/20	DB9.75/20	Her RWC3	6-4 1/2 x 5 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In High
57		H-24	5 1/2 - 6 1/2	5300	196	Op	24000	8700	B9.75/20	DB9.75/20	Her RWC3	6-4 1/2 x 5 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In Low
58	Netco.	A 1 1/2 - 2	2800	168	168	8400	4000	B6.00/20	DB6.00/20	Her WXC	6-4 1/2 x 5 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In High	
59		B 2 1/2 - 3	3000	155	183	12600	5000	B7.50/20	DB7.50/20	Wau 6ZK	6-3 1/2 x 4 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In Low	
60		C 3	3500	148	200	15300	6000	B8.25/20	DB8.25/20	Wau 6TL	6-3 1/2 x 4 1/2	Fu BL 724	U 4 No Tim 52000B2 SF R 6.4 In High	
61		E 3 1/2	4500	140	200	23400	7500	B9.75/20	DB9.75/20</					

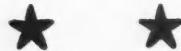
Line Number	ENGINE DETAILS										FUEL SYST.	ELEC-TRICAL	FRONT AXLE	BRAKES			BODY MOUNT-ING DATA		SPRINGS													
	Piston Displacement	Compression Ratio	Torque lb. ft.	N.A.C.C. Rated H.P.	M.H.P. Brake H.P. at R.P.M. Given	Valve Arrangement	Camshaft Drive	Piston Material	Main Bearings	Length				Governor Make	Carburetors Make	Fuel Feed	Ignition System Make	Generator, Starter Make	Clutch Type and Make	Radiator Make	Universals Make	Steering Gear Make	Make, Location Type, Operation	Lining Area	Drum Material	Hand Type, Location	Cab to Rear of Frame	Cab to Rear Axle	Width of Frame	Front	Rear	Auxiliary Type
12991 4.9 195 133.5 5.5 82-2600 L/G C 4-2 10 PC Ha Zen M AL AL D.Fu Pe Spi Tim 33020H Ros L4IHV 367 D FD 140 1/4 93 32 39x2 1/2 60x3																																
23542 4.3 228 36.2 86-2300 L/G G 7-3 PC Wa Zen M AL AL D.Fu Pe Spi Tim 35000H Ros L4IHV 458 D FD 144 75 32 39x2 1/2 60x3																																
3162 1.6 310 46. 97-2000 L/G G 7-3 PC Wa Zen M AL AL D.Fu Pe Spi Tim 27450W Ros L4IHW 468 D FD 168 88 32 44x3 60x3																																
4462 4.6 324 46. 125-2400 L/G C 7-3 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 275 C TX 96 58 34 37 1/2 x2 1/2 49 1/2 x2 1/2																																
5248 4.1 150 27.3 65-2800 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 275 C TX 128 81 34 37 1/2 x2 1/2 50x2 1/2																																
6248 4.1 150 27.3 65-2800 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 31000H Ros L4IH 293 C TX 128 81 34 37 1/2 x2 1/2 50x2 1/2																																
7248 4.1 150 27.3 65-2800 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 293 C TX 128 81 34 37 1/2 x2 1/2 50x2 1/2																																
8315 4.6 200 33.7 72-2500 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 345 C TX 128 81 34 37 1/2 x2 1/2 50x2 1/2																																
9381 4.4 242 40.8 85-2500 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 35000H Ros L4IH 385 C CD 128 81 34 38x2 1/2 53x3																																
104624 5.3 300 45.9 98-2000 L/G A 7-3 PC Wa Str M DR DR D.Fu Ch Spi Tim 35000H Ros L4IH 385 C CD 128 81 34 38x2 1/2 53x3																																
114624 5.3 300 45.9 98-2000 L/G A 7-3 PC Wa Str M DR DR D.Fu Ch Spi Tim 35000H Ros L4IH 485 C RI 128 81 34 38x2 1/2 53x3																																
12260 5.2 170 29.4 70-2800 L/G G 7-3 9% FP Ha Zen M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 247 C TX 95 63 32 40 1/2 x2 1/2 54x2 1/2																																
13298 5.3 200 33.7 80-2600 L/G G 7-3 9% FP Ha Zen M DR DR P.BL Pe Spi Tim 31000H Ros L4IH 247 C TX 95 63 32 40 1/2 x2 1/2 54x2 1/2																																
14393 8.2 260 40.1 101-2400 L/G G 7-3 11% FP Ha Zen M DR DR P.BL Pe Spi Tim 35000H Ros L4IH 412 a TD 114 143 1/2 91 1/2 33 42x3 58x3																																
15411 5.3 272 40.8 100-1000 L/G G 7-3 11% FP Ha Zen M DR DR P.BL Pe Spi Tim 35020H Ros L4IH 412 a TD 144 91 1/2 33 42x3 58x3																																
16475 7.3 188 51.3 100-2000 L/G G 7-3 15% PC Ha Zen M DR DR D.BL Ch Spi Tim 35020H Ros L4IH 527 a TD 144 92 1/2 33 42x3 58x3																																
17517 5.3 322 51.3 107-2000 L/G G 7-3 15% FP Wa Str M DR DR P.BL Ch Spi Tim 30000H Ros L4IH 527 a TD 143 1/2 91 1/2 33 42x3 58x3																																
18517 5.3 322 51.3 107-2000 L/G G 7-3 15% FP Wa Str M DR DR P.BL Ch Spi Tim 35000TW Ros L4IH 527 a TD 143 1/2 91 1/2 33 42x3 58x3																																
20425 5.1 145 35.4 90-2600 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 26450TW Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
21309 4.7 183 31.5 75-2500 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
22309 4.7 183 31.5 75-2500 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
22283 4.4 216 38.4 94-2400 L/G G 7-3 15% FP Ha Str M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
24283 4.4 216 38.4 94-2400 L/G G 7-3 15% FP Ha Str M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
25309 4.7 183 31.5 75-2500 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
26309 4.7 183 31.5 75-2500 L/G G 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
27414 5.6 261 38.4 94-2400 L/G G 7-3 15% FP Ha Str M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
28414 5.6 261 38.4 94-2400 L/G G 7-3 15% FP Ha Str M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
30468 7.2 292 43.4 104-2300 L/G G 7-3 15% FP Ha Str M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
31468 7.2 292 43.4 104-2300 L/G G 7-3 15% FP Ha Str M DR DR P.BL Pe Spi Tim 30000H Ros L4IH 302 P EX 109 64 1/2 33 40 1/2 x2 1/2 52x2 1/2																																
32525 8.3 350 48.6 125-2300 L/G G 4-3 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 618 a TD 120 73 33 42x3 58x3																																
33611 5.0 398 54.2 128-2200 L/G G 4-3 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 618 a TD 120 73 33 42x3 58x3																																
34473 5.0 320 40.0 75-1800 L/G G 3-3 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 618 a TD 120 73 33 42x3 58x3																																
35473 3.9 320 10.0 75-1800 L/G G 3-3 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 618 a TD 120 73 33 42x3 58x3																																
36611 5.0 398 54.2 128-2200 L/G G 4-3 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 618 a TD 120 73 33 42x3 58x3																																
37468 4.7 292 43.4 104-2300 L/G G 7-3 15% FP Ha Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
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39473 9.3 320 10.0 75-1800 L/G G 3-3 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
40471 3.9 320 40.0 75-1800 L/G G 3-3 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
41611 5.0 398 54.2 128-2200 L/G G 4-3 1/2 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
42706 4.8 342 60.0 138-2000 L/G G 3-3 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
43282 5.3 190 33.7 73-2800 L/G A 7-2 1/2 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
44339 4.7 212 38.4 76-2400 L/G A 7-2 1/2 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
45339 4.7 212 38.4 76-2400 L/G A 7-2 1/2 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
46383 4.7 261 43.3 92-2400 L/G A 7-2 1/2 PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
47424 4.4 289 45.9 94-2200 L/G A 7-3 15% PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
48479 4.4 320 51.3 103-2200 L/G A 7-3 15% PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
49529 9.3 350 51.3 115-2200 L/G A 7-3 15% PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
50707 4.5 550 60.0 150-2000 L/G A 7-3 15% PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
51555 4.5 550 72.8 180-2000 L/G A 7-3 15% PC No Str M DR DR P.O. Pe Spi Tim 30000H Ros L4IH 619 a FX 109 108 1/2 33 40 44x2 1/2 54x3																																
52282 0.1 76 33.8 73-2800 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
53339 4.7 212 38.4 76-2400 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
55339 4.7 212 38.4 76-2400 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
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58504 5.9 330 48.6 110-2200 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
59222 4.9 142 37.3 65-2600 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
60255 1.1 70 27.3 65-2600 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
61381 4.6 261 38.4 94-2400 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
62462 4.6 300 45.9 100-2400 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
63511 5.3 335 48.6 110-2400 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
64422 5.2 310 45.1 140-2800 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
65335 4.7 225 38.4 81-2200 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
66253 4.7 225 38.4 81-2200 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
67253 4.7 225 38.4 81-2200 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
68339 4.7 210 38.4 70-2000 L/G C 7-2 1/2 PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
70428 4.4 278 45.9 90-2000 L/G C 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
71501 4.9 330 48.6 106-2000 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
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73501 9.3 350 51.2 112-2000 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
74529 9.3 350 51.2 112-2000 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
75707 4.5 455 60.0 140-1800 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
76779 4.5 500 66.2 154-1800 L/G A 7-3 15% PC No Str M DR DR D.BL Ch Spi Tim 30000H Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
77385 0.5 274 39.2 125-2200 L/G A 9-2 1/2 14% CC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
78298 4.7 190 33.7 70-2600 L/G C 7-2 1/2 13% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
79361 4.7 229 40.3 77-2400 L/G C 7-2 1/2 13% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
80361 4.7 229 40.3 77-2400 L/G C 7-2 1/2 13% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
81479 4.7 218 51.3 104-2200 L/G A 7-3 15% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
82461 4.7 229 40.3 77-2400 L/G A 7-3 15% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
83479 4.6 320 51.3 104-2200 L/G A 7-3 15% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
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87611 4.5 410 54.1 130-2000 L/G A 7-3 15% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x2 1/2																																
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89611 4.5 410 54.1 130-2000 L/G A 7-3 15% PC Ha Zen M DR DR P.B. Pe Spi Tim 14706 Ros L4IH 247 a TD 120 73 33 40 1/2 x2 1/2 52x																																

Line Number	MAKE AND MODEL	Wheels Driven - 6-Wheelers	GENERAL (See Keynote)				TIRE SIZE		MAJOR UNITS						FRAME			
			Tonnage Rating		Chassis Price	Standard Wheelbase	Max. W. B. Furnished	Gross Vehicle Weight	Chassis Wt. (Stripped)	Front	Rear	Make and Model	No. of Cylinders Bore and Stroke	Location and Forward Speeds	Aux. Location and Speeds	Make and Model	Drive and Torque	Gear Ratios
			Front	Rear	Make and Model	No. of Cylinders Bore and Stroke	Location and Forward Speeds	Aux. Location and Speeds	Make and Model	Drive and Type	Gear Ratios							
1. Sterling (con't)	FB70 2 1/2-3	2635	174	204	13000	5755	B7 50/20	B7 50/20	Wau ML	6-4x4 1/2	Own UC7	U 5	No Own	BF	R 7.4	52.7	10x3x1 1/2	
2.	FD80 3 1/2-4	3065	174	204	16000	6680	B8.25/20	B8.25/20	Wau 6ML	6-4x4 1/2	Own UC7	U 5	Op Own	2F	R 7.8	55.3	10x3x1 1/2	
3.	FB80 Sp 3 1/2-4	3010	174	204	16000	6680	B8.25/20	B8.25/20	Wau ML	6-4x4 1/2	Own UC7	U 5	No Own	BF	R 7.8	55.6	10x3x1 1/2	
4.	FC90 4	4105	174	204	18000	7480	B9.00/20	B9.00/20	Wau 6MK	6-4x4 1/2	Own UC7	U 5	Op Own	CD	R 8.66	61.7	10x3x1 1/2	
5.	FD90 4	3315	174	204	18000	7480	B9.00/20	B9.00/20	Wau MK	6-4x4 1/2	Own UC7	U 5	No Own	2F	R 8.0	57.0	10x3x1 1/2	
6.	FW97S 4-5	4355	192	222	19500	8200	P36x8	P36x8	Wau 6SR	6-4x5 1/2	Own UC2	U 4	Op Own	w/2F	R 7.75	51.6	12x3x1 1/2	
7.	FC100 5 1/2-6	4185	192	222	20000	7750	P36x8	P36x8	Wau 6MK	6-4x4 1/2	Own UC2	U 4	Op Own	CD	R 9.3	61.2	12x3x1 1/2	
8.	FC105 5 1/2-6	4645	192	222	21000	8000	B9.00/20	B9.00/20	Wau 6SR	6-4x5 1/2	Own UC	U 5	Op Own	CD	R 8.66	61.2	12x3x1 1/2	
9.	FW115, FD115 7-8	4700	192	222	23000	8750	P40x8	P40x8	Wau 6SR	6-4x5 1/2	Own UC2	U 4	Op Own	w/2F	R 8.20	54.6	12x3x1 1/2	
10.	FC120S 7-8	4900	192	222	24000	8400	B9.75/20	B9.75/20	Wau 6SR	6-4x5 1/2	Own UC2	U 4	Op Own	CD	R 8.66	61.7	12x3x1 1/2	
11.	FW140, FD140 7-8	6005	192	222	28000	10050	P40x8	P40x8	Wau SRL	6-4x5 1/2	Own UC2	U 4	J 3 Own	CD	R 10.0	66.6	15x3x1 1/2	
12.	FC135 7-8	4800	192	222	27000	8900	P40x8	P40x8	Wau SRL	6-4x5 1/2	Own UC2	U 4	Op Own	CD	R 9.3	62.2	15x3x1 1/2	
13.	FC140 8-8 1/2	5595	200	230	28000	9350	P40x8	P40x8	Wau HB	6-4x5 1/2	Own UC2	U 4	Op Own	CD	R 8.3	55.9	15x3x1 1/2	
14.	FC145 8-8 1/2	6180	200	230	30000	10100	P40x8	P40x8	Wau AB	6-4x5 1/2	Own UC8	U 4	Op Own	CD	R 9.4	58.9	15x3x1 1/2	
15.	FW170, FD170 9 1/2-10	6800	200	230	34000	10550	P40x8	P40x8	Wau RB	6-5x5 1/2	Own UC8	U 4	Op Own	w/2F	R 10.6	62.7	15x3x1 1/2	
16.	FC170 9 1/2-10	6900	200	230	34000	10550	P40x8	P40x8	Wau RB	6-5x5 1/2	Own UC8	U 4	Op Own	CD	R 9.4	58.9	15x3x1 1/2	
17.	FD170 12-12 1/2	8925	200	230	39000	10750	B10.50/20	B10.50/20	Cum H Die.	6-4x6	BL 734	U 4	Op Wls 1910W	2F	R 8.88	55.8	15x3x1 1/2	
18.	Stewart 41X 3/4	695	124	134	2875	686.50/18	Lyc	6-3 1/2 x 1 1/2	WG	U 4	No Cla	S 1/2	H 35.1	62x2 1/2	Side Rail Dimensions			
19.	42X 1 1/2	795	134	176	3525	B6.50/20	B6.50/20	Lyc	6-3 1/2 x 1 1/2	WG	U 4	No Cla	SF	H 35.8	71 1/2x2 3/4	Type		
20.	43X 2	995	145	176	4005	B6.50/20	B6.50/20	Lyc	6-3 1/2 x 1 1/2	WG	U 4	No Cla	SF	H 6.3	72 1/2x2 3/4			
21.	29XS 2	1695	145	190	4990	B7.00/20	B7.00/20	Lyc	6-3 1/2 x 1 1/2	Ful	U 4	No Cla	SF	R 6.37	44.9 7 1/2x2 3/4			
22.	32X 2 1/2	1990	165	220	5260	B7.00/20	B7.00/20	Lyc	6-3 1/2 x 1 1/2	Fu	U 4	No Cla	SF	R 6.37	44.9 7 1/2x2 3/4			
23.	58-S 2 1/2	2390	170	226	5970	B7.50/20	B7.50/20	Lyc	8-3 1/2 x 1 1/2	BL	U 5	No Cla	SF	R 7.1	47.0			
24.	18X 3	2690	165	220	6400	B7.50/20	B7.50/20	Lyc	6-3 1/2 x 5	BL	U 5	No Tim	WF	R 7.25	47.5			
25.	48-S 3	2990	170	241	6750	B8.25/20	B8.25/20	Lyc	8-3 1/2 x 1 1/2	BL	U 4	No Cla	WF	R 7.1	50.1			
26.	19X 3 1/2	3690	165	235	7110	B9.00/20	B9.00/20	Lyc	6-3 1/2 x 5	Fu	U 4	A 3 Tim	WF	R 7.25	127			
27.	36-S 3 1/2	3990	170	241	7600	B9.00/20	B9.00/20	Lyc	6-4 1/2 x 1 1/2	BL	U 4	A 3 Tim	2F	R 7.3	147			
28.	35-S 3 1/2	3990	170	241	7600	B9.00/20	B9.00/20	Lyc	8-3 1/2 x 1 1/2	BL	U 4	A 3 Tim	2F	R 7.3	147			
29.	31X 7	5190	165	235	9349	B7.75/24	B7.75/24	Lyc	6-4 1/2 x 1 1/2	BL	U 4	A 3 Tim	WF	R 7.89	51.5			
30.	27XS 7	6190	165	235	10000	B10.50/24	B10.50/24	Lyc	6-4 1/2 x 1 1/2	BL	U 4	A 3 Tim	WF	R 6.56	93.8			
31.	Studebaker (11S) 8-1/2-2 1/2	785	130	165	9000	3110	B6.00/20	P36x20	Wau	6-5x5 1/2	T9	U 4	No Cla	SF	H 5.66	36.2		
32.	8-1/2-2 1/2	1350	141	183	10500	3385	B6.00/20	B6.00/20	Wau	6-5x5 1/2	T9	U 4	No Cla	SF	H 5.4	35.1		
33.	S-6 2 1/2	945	145	163	12000	3920	B6.00/20	B6.00/20	Wau	6-5x5 1/2	T9	U 4	No Cla	SF	H 5.6	35.8		
34.	S-6 2 1/2	4500	145	163	16000	4855	B6.50/20	P22x6	Wau	6-5x5 1/2	T9	U 4	No Cla	SF	H 6.3	43.5		
35.	Walter FN 3 1/2-3	4500	140	164	15000	6500	B6.00/20	B6.00/20	Own 6MK	6-4x4 1/2	FN	U 4	No Tim	SD	H 6.3	43.5		
36.	FN 3 1/2-3	5000	140	164	18000	7500	B9.00/20	B9.00/20	Own 6SR	6-4x5 1/2	FM	U 5	No Own	SD	H 6.3	57.8		
37.	EKD 4-6	6000	118	136	24000	8500	B9.00/24	B9.00/24	Own 6SR	6-4x5 1/2	FK	U 5	No Own	SD	H 6.3	57.8		
38.	FCS 6-7	7200	136	160	27000	9500	B9.75/24	B9.75/24	Own 6SR	6-4x5 1/2	FK	U 5	No Own	SD	H 6.3	57.8		
39.	FBS 6-7	7900	136	160	27000	9500	B9.75/24	B9.75/24	Own 6R	6-5x5 1/2	FH	U 5	No Own	SD	H 6.3	57.8		
40.	FBR 7-9	8300	136	160	32000	10500	B10.50/24	B10.50/24	Own 6R	6-5x5 1/2	FH	U 5	No Own	SD	H 6.3	57.8		
41.	Ward La Fr. 29R14 2 1/2	2800	176	208	4000	6000	B7.50/20	B7.50/20	Wau	ML	6-4x4 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
42.	29R18 3	2975	176	208	16000	6200	B8.25/20	B8.25/20	Wau	ML	6-4x4 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
43.	29R18 3 1/2-4	3275	176	208	18000	6400	B9.00/20	B9.00/20	Wau	ML	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
44.	30R19 3 1/2-4	3675	164	226	19000	7000	B9.00/20	B9.00/20	Wau	ML	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
45.	30R23 3 1/2-5	4175	194	226	23000	7300	B9.75/24	B9.75/24	Wau	ML	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
46.	35R 7-9	4975	194	226	25000	8700	B9.75/24	B9.75/24	Wau	SRL	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
47.	55RH 7-9	5535	203	224	30000	10000	B10.50/24	B10.50/24	Wau	RB	6-5x5 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
48.	55RW 7-9	5575	203	224	30000	10050	B10.50/20	B10.50/20	Wau	RB	6-5x5 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
49.	55RW 7-9	5575	203	224	30000	10050	B10.50/20	B10.50/20	Wau	RB	6-5x5 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
50.	75RS 7-9	6750	210	231	30000	10600	B10.50/20	B10.50/20	Wau	RB	6-5x5 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
51.	50D 7-9	5975	159	173	36000	11000	P40x8	P40x8	Wau	SRL	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
52.	100RW 7-10	7350	210	231	36000	11500	B10.50/24	B10.50/24	Wau	RB	6-5x5 1/2	BL	U 4	No Tim	SD	H 6.3	43.5	
53.	White (12) 60K	1850	124	132	3905	B7 00/20	B7 00/20	Lyc	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5			
54.	60K 12 1/2-2	1850	124	132	4420	B7 50/20	B7 50/20	Lyc	6-4 1/2 x 1 1/2	BL	U 4	No Tim	SD	H 6.3	43.5			
55.	60K 12 1/2-2																	

Line Number	MAKE AND MODEL	GENERAL (See Keynote)					TIRE SIZE		MAJOR UNITS				FRAME							
		Wheels Driven—6-Wheelers		Chassis Price	Standard Wheelbase	Max. W. B. Furnished	Gross Vehicle Weight	Chassis Wt. (Stripped)	Front	Rear	ENGINE	TRANSMISSION	REAR AXLE							
		Tonnage Rating											No. of Cylinders	Bore and Stroke						
1	Ind. 95SBT-151	2C	167.5	168	186	20000	5500	P32x6	DP32x6	Her JXC	6-3½ x 4½	BL 224	U 4	Tim SBT151	SF	T 7.4	45.8	7½ x 2½ x 3½	C	
2	95SW 75	4R	173.5	168	186	20000	5800	P32x6	DP32x6	Her JXC	6-3½ x 4½	BL 224	U 4	No Tim SW75	WF	T 7.4	45.8	7½ x 2½ x 3½	C	
3	17SBT-25	2C	3250	188	224	28000	8550	P34x7	DP34x7	Her YXC	6-4½ x 5½	BL 334	U 4	Tim SBT25	WF	R 6.1	37.8	8½ x 3½ x 5½	TL	
4	17SW-25	4R	347.5	188	224	28000	9000	P34x7	DP34x7	Her YXC	6-4½ x 5½	BL 334	U 4	Op Tim SW25	WF	R 6.2	38.6	8½ x 3½ x 5½	TL	
5	106SW-151	4R	267.5	188	212	24000	7500	P32x6	DP32x6	Her WXC	6-4½ x 5½	BL 324	U 4	No Tim SW151	WF	R 6.4	42.6	8½ x 3½ x 5½	T	
6	Ken. 186SDT-2	10	6450	205	235	38000	10500	B9.00/20	B9.00/20	Her YXC2	6-4½ x 5½	BL 155½	U 4	3 Tim Sdt310w	2F	H 7.3	104	9½ x 3½ x 5½	T	
7	241SDT	2C	10	6850	205	235	40500	11000	B9.00/20	B9.00/20	Her RXB	6-4½ x 5½	BL 714	U 4	A 3 Tim Sdt310w	2F	H 7.3	85	9½ x 3½ x 5½	CCCC
8	346A	4R 10	8500	210	240	40500	13000	B9.75/20	B9.75/20	Bud GF-6	6-4½ x 6	BL 714	U 4	A 3 Tim Sdt310w	WF	H 7.25	84.5	9½ x 3½ x 5½	CCCC	
9	346C	4R 10	9500	210	240	40500	14000	B9.75/20	B9.75/20	Bud GF-6	6-4½ x 6	BL 714	U 4	A 3 Tim Sdt310w	WF	H 7.25	98.4	9½ x 3½ x 5½	CCCC	
10	386C	4R 10	10200	210	240	50100	14500	B9.75/20	B9.75/20	Has 175	6-5x6	BL 714	U 4	A 3 Tim Sdt310w	WF	H 7.60	104	9½ x 3½ x 5½	CCCC	
11	Kleiber	280	4R 7½	6000	201	210	28000	10600	B9.00/20	Con 20R	6-4½ x 3½	BL 714	U 4	A 3 Tim Sdt310w	WF	R 7.75	73.6	7½ x 3½ x 5½	PP	
12	340	4R 10	7000	210	215	34000	11900	B9.75/20	B9.75/20	Con 21R	6-4½ x 3½	BL 714	U 4	A 3 Tim Sdt310w	WF	R 7.93	88.6	8½ x 3½ x 5½	PP	
13	340T	4R 10	8000	215	225	34000	13650	B9.75/20	B9.75/20	Con 22R	6-4½ x 5½	BL 714	U 4	A 3 Tim Sdt310w	WF	R 10.3	98.1	8½ x 3½ x 5½	PP	
14	La Fran-R. Q6	4R 9-12	11600	216	260	40000	14900	B10.50/20	Own 312B	Wau 68RK	6-4½ x 5½	BL 714	U 4	No Tim SWD410	WF	Opt Opt	12½ x 3½ x 5½	13		
15	LeMoon(9) 701	4R 5-6	4475	187	199	25500	8500	B8.25/20	B8.25/20	Lyc AEC	8-3½ x 4½	Fu VUOG	U 5	No Tim 63703-97H	WF	R 6.20	43.8	7½ x 4½	B	
16	801	4R 6-7	5100	180	199	32500	9720	B9.00/20	B9.00/20	Lyc AEC	8-3½ x 4½	Fu VUOG	U 5	No Tim 65703-97H	WF	H 6.75	47.7	7½ x 4½	B	
17	802	4R 6-7	5350	187	199	32500	9800	B9.00/20	B9.00/20	Wau 6SRL	6-4½ x 5½	BL 607	U 7	No Tim SW310w	WF	H 9.25	86.9	9½ x 4½	B	
18	900	4R 7-8	6775	191	203	36000	12000	B9.75/20	B9.75/20	Wau 6AB	6-4½ x 5½	BL 714	U 4	A 3 Tim SW310w	WF	H 9.25	128	9½ x 4½	B	
19	1000	4R 8-10	7950	196	208	40000	12600	B9.75/24	B9.75/24	Wau 6RB	6-5x5	BL 714	U 4	A 3 Tim SW310w	WF	H 9.25	128	9½ x 4½	B	
20	1200	4R 10-12	8500	196	208	40000	14000	B9.75/24	B9.75/24	Cum. Dle H6	6-4½ x 6	BL 735	U 5	No Tim SW410w	WF	H 7.6	47.6	9½ x 4½	B	
21	1200D	10-12	9750	196	208	40000	14000	B9.75/24	B9.75/24	Wau 68RK	6-4½ x 5½	BL 615	U 5	A 5 Tim SWT420	WF	H 7.6	62.5	12½ x 3½	P	
22	Maccar. SW86	2R 10-15	8250	216	250	38700	14450	B10.50/20	Own BX	Wau 68RK	6-4½ x 5½	BL 724	U 4	A 3 Tim SWT420	WF	H 7.6	62.5	12½ x 3½	P	
23	Mack. BX	4R 8-10	35400	178	207	12000	18000	B8.25/22	B8.25/22	Own BX	6-4½ x 5½	Own BX	U 4	A 3 Tim SWT420	WF	R 6.54	41.9	10½ x 3½ x 5½	CCCC	
24	BQ	4R 8-10	9350	224	248	41500	15000	B9.75/22	B9.75/22	Own BQ	6-4½ x 5½	Own BQ	U 4	A 3 Tim SWT420	WF	R 9.26	59.4	8½ x 3½ x 5½	CCCC	
25	AC	4R 8-15	8500	217	257	50500	14550	P40x8	DP40x8	Own AC	6-4½ x 5½	Own AC	U 4	A 3 Tim SWT420	WF	R 7.46	47.8	8½ x 3½ x 5½	CCCC	
26	AK	4R 8-15	9000	217	257	50500	15900	B9.75/22	B9.75/22	Own AC	6-4½ x 5½	Own AC	U 4	A 3 Tim SWT420	WF	R 9.26	59.4	8½ x 3½ x 5½	CCCC	
27	AP	4R 8-15	10500	217	257	51000	14850	P40x8	DP40x8	Own AP	6-5x6	Own AP	U 4	A 3 Tim SWT420	WF	R 7.46	47.8	8½ x 3½ x 5½	CCCC	
28	AP	4R 8-15	11000	217	257	50500	16400	B9.75/22	B9.75/22	Own AP	6-5x6	Own AP	U 4	A 3 Tim SWT420	WF	R 9.26	59.4	8½ x 3½ x 5½	CCCC	
29	Mar-Herr. TH310A-6	7½-10	10000	191	229	34070	13800	B9.75/22	B9.75/22	Her RXC	6-4½ x 5½	Fu VUOG	U 5	A 2 Tim SD310W	2F	R 9.11	164	8½ x 3½ x 5½	PP	
30	TH320-6	10-12	15000	225	255	34075	18900	B10.50/22	B10.50/22	Her RXB	6-5x6	BL 724	U 4	A 3 Tim SD420A	2F	R 9.11	189	10½ x 3½ x 5½	PP	
31	RA-15	4	15500	170	Op	15500	5300	B6.50/20	B6.50/20	Her HXD	6-5½ x 6	BL 734	U 4	A 3 Tim SD510	2F	R 10.2	189	10½ x 3½ x 5½	P	
32	RA-20	2C 5-5½	1985	184	Op	20000	6350	P32x6	DP32x6	Her JXC	6-3½ x 4½	BL 224	U 4	No Tim SBT175	SF	R 5.66	35.0	7½ x 2½ x 5½	T	
33	P.-A. 34L501S4	4R	6600	200	240	34000	13200	B9.75/20	B9.75/20	Her RXB	6-4½ x 5½	Co TNU	U 4	Op Tim SW310	W	A 9.25	49.0	10½ x 3½	C	
34	34K611S4	4R	7200	180	240	34000	14200	B9.75/20	B9.75/20	Her GXA	6-4½ x 5½	Own 618290	U 4	Op Tim SW310	W	A 7.75	40.6	10½ x 3½	C	
35	44K77984	4R	7500	180	200	44000	14500	B10.50/20	B10.50/20	Her HXA	6-5½ x 6	Own 618290	U 4	Op Tim SW410	W	A 9	47.2	10½ x 3½	C	
36	Relay	60SW 2R 10	6545	175	205	36500	12000	P38x7	DP40x8	Bud BA6	6-4½ x 5½	Fu VU16	U 5	No Own 60	2R	R 9.09	63.6	8½ x 3½ x 5½	P	
37	SterlingFBT152	2R 8½	4550	174	204	30400	9500	B9.00/20	B9.00/20	Wau 6-110	6-4½ x 4½	Own UC7	U 5	No Own	BF	R 7.8	55.5	10½ x 3½ x 5½	PP	
38	FDT152	2R 8½	4705	174	204	30400	9700	B9.00/20	B9.00/20	Wau 6-110	6-4½ x 4½	Own UC7	U 5	No Own	2F	R 9.0	52.7	10½ x 3½ x 5½	L	
39	FDS180	4R 8-10	8925	158	Op	36000	12850	P40x8	DP40x8	Wau AB	6-4½ x 5½	Own UC8	U 4	A 3 Tim 310	2F	R 9.1	113	15½ x 3½ x 5½	L	
40	FDS200	4R 10-12	9510	159	Op	40000	13550	P40x8	DP40x8	Wau RB	6-5x5	Own UC8	U 4	A 3 Tim 410	2F	R 9.1	113	15½ x 3½ x 5½	L	
41	FCS210	4R 15-18	10825	Op	42000	14750	P40x8	DP40x8	Wau RB	6-5x5	Own UC8	U 4	A 3 Own	CD	R 9.5	56	15½ x 3½ x 5½	L		
42	FDT200	2R 12-12½	7670	178	208	40000	12050	P40x8	DP40x8	Wau 6-125	6-4½ x 5½	Own UC2	U 4	Op Own	2F	R 8.85	58.8	12½ x 3½ x 5½	L	
43	FDT250	2R 16-16½	8855	186	216	50000	13550	P42x9	DP42x9	Wau RB	6-5x5	Own UC8	U 4	Op Own	2F	R 8.85	55.5	15½ x 3½ x 5½	L	
44	FCT180	2R 10-10½	7265	178	208	36000	11200	P36x8	DP36x8	Wau SRL	6-4½ x 5½	Own UC2	U 4	Op Own	CD	R 8.2	54.5	12½ x 3½ x 5½	L	
45	FCT200	2R 12-12½	7685	178	208	40000	11800	P40x8	DP40x8	Wau 6-125	6-4½ x 5½	Own UC2	U 4	Op Own	CD	R 9.3	61.8	12½ x 3½ x 5½	L	
46	Wht. 630SW200	4R 5-6	6245	193	205	10000	8525	B25/20	B25/20	Own 3AD	6-4½ x 5½	Own 4B	U 4	No Tim SW200H	WF	R 6.75	44.2	8½ x 3½ x 5½	C	
47	642SW320	4R 7-9	8025	198	210	12670	90/20	B9.00/20	B9.00/20	Own 1AB	6-4½ x 5½	Own 7B	U 4	No Tim SW310W	WF	R 8.5	55.6	8½ x 3½ x 5½	C	
48	643SW420	4R 9-11	8550	198	215	14400	14400	P40x8	DP40x8	Own 1AB	6-4½ x 5½	Own 7B	U 4	No Tim SW410W	WF	R 10.2	69.1	8½ x 3½ x 5½	C	

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Line Number	ENGINE DETAILS						FUEL SYST.	ELEC-TRICAL	MAIN BEARINGS	CAMShaft Drive	Piston Material	Torque lb. ft.	N.A.C.C. Rated H.P.	Max. Brake H.P. at R.P.M. Given	Valve Arrangement	Number and Diameter	Length	Governor Make	Carburetors Make	Fuel Feed	Oiling System Make	Generator, Starter Make	Clutch Type and Make	Radiator Make	Universals Make	FRONT AXLE	STEERING GEAR MAKE	BRAKES			BODY MOUNTING DATA		SPRINGS	
	Piston Displacement	Compression Ratio	Max. Brake H.P. at R.P.M. Given	Valve Arrangement	Cams	Length																		Service	Hand Type, Location	Width of Frame	Front	Rear	Auxiliary Type					
1282	5.3	186	33.7	73-2800	L	G	A	7-2-3½	10	PC	No	Str	AL	AL	P-BL	Yo	Spi	Tim 31020	Ros	L61HV	550G	TX	140	83	34	37x2½	52x4	N						
2	282	186	33.7	73-2800	L	G	A	7-2-3½	10	PC	No	Str	AL	AL	P-BL	Yo	Spi	Tim 31020	Ros	L61HV	459	TX	140	83	34	37x2½	44x3	N						
3428	4.4	283	45.9	94-2200	L	G	A	7-2-3½	10	PC	No	Str	AL	AL	P-BL	Yo	Spi	Shu 5582B	Ros	L61HV	625	CD	168	101	34	40x2½	52x4	N						
4	428	4.4	283	45.9	94-2200	L	G	A	7-2-3½	10	PC	No	Str	AL	AL	P-BL	Yo	Spi	Shu 5582B	Ros	L61HV	625	CD	168	101	34	40x2½	52x4	N					
5	339	4.7	216	38.4	76-2400	L	G	A	7-2-3½	10	PC	No	Str	AL	AL	P-BL	Yo	Spi	Shu 5572	Ros	L61HV	559	CD	168	101	34	39x2½	52x4	N					
6	453	4.7	300	48.6	98-2200	L	G	A	7-2-3½	14	CC	Zen	Str	DR	DR	P-BL	Pe	Spi	Tim 35000H	Ros	W64R	815	FD	192	120	33	42x3	56x4	N					
7	501	4.9	330	48.6	110-2200	L	G	A	7-2-3½	12½	CC	Zen	Str	DR	DR	P-BL	Pe	Spi	Tim 36020N	Ros	W64R	815	FD	192	120	33	42x3	56x4	N					
8	458	4.4	322	42.3	125-2400	H	G	A	4-2-3½	10½	FP	No	Str	DR	DR	P-BL	Pe	Spi	Tim 36020N	Ros	W64R	815	FD	192	120	33	42x3	56x4	N					
9	638	4.5	410	54.1	126-1850	L	G	A	7-2-3½	10½	CC	Bu	Str	DR	DR	P-BL	Pe	Spi	Tim 36020N	Ros	W64R	815	FD	192	120	33	42x3	56x4	N					
10	707	4.4	506	60.0	170-2000	H	G	A	7-2-3½	11½	FP	HS	Str	DR	DR	P-BL	Pe	Spi	Tim 36020N	Ros	W64R	815	FD	192	120	33	42x3	56x4	N					
11	707	4.4	506	60.0	170-2000	H	G	A	7-2-3½	11½	FP	HS	Str	DR	DR	P-BL	Pe	Spi	Tim 36020N	Ros	W64R	815	FD	192	120	33	42x3	56x4	N					
12	411	4.2	236	40.0	89-2400	H	G	A	7-2-3½	13	PC	No	Str	VR	DR	D-BL	Ow	Spi	Tim 16302	Ros	T41A	848	G	TD	180	120	38	44x3	60x4	N				
13	427	4.2	267	45.4	91-100-2600	H	G	A	7-2-3½	13	FP	No	Str	VR	DR	D-BL	Ow	Spi	Tim 16302	Ros	T41A	848	G	TD	180	130	38	44x3	60x4	N				
14	638	4.2	340	54.0	120-2400	H	G	A	7-2-3½	13	FP	No	Str	VR	DR	D-BL	Ow	Spi	Tim 17300	Ros	T41A	848	G	TD	204	130	38	44x3	60x4	N				
15	754	5.1	510	76.7	240-2900	H	G	A	4-3-3½	10	PC	No	Str	DR	DR	dP	Lo	Ow	Bl	Tim 27450TW	Ros	W61A	782	D	CD	111	216	34	44x3	None	N			
16	420	5.2	300	44.4	140-2300	L	G	A	5-2-3½	12½	FP	Ha	Str	DR	DR	D-Fu	Ch	Spi	Tim 35000H	Ros	L61HV	525	CD	162	108	34	39x2½	46x3	N					
17	420	5.2	300	44.4	140-2300	L	G	A	5-2-3½	12½	FP	Ha	Str	DR	DR	D-Fu	Ch	Spi	Tim 35000H	Ros	L61HV	633	CD	162	108	34	39x2½	46x3	N					
18	462	4.5	300	45.9	98-2000	L	G	A	7-2-3½	13½	PC	We	Str	DR	DR	D-Fu	Ch	Spi	Tim 35000H	Ros	W61A	711	CD	162	108	34	39x2½	46x3	N					
19	462	4.5	300	45.9	98-2000	L	G	A	7-2-3½	13½	PC	We	Str	DR	DR	D-Fu	Ch	Spi	Tim 26045TW	Ros	W61A	966	CD	162	108	34	48x3	53x4	N					
20	549	4.5	322	48.6	100-2000	L	G	A	7-2-3½	13½	PC	We	Str	DR	DR	D-Fu	Ch	Spi	Tim 26045TW	Ros	W61A	966	CD	162	108	34	48x3	53x4	N					
21	677	4.6	150	60.0	127-2000	L	G	A	7-2-3½	13½	PC	We	Str	DR	DR	D-Fu	Ch	Spi	Tim 27450TW	Ros	W61A	792	CD	162	108	34	48x3	53x4	N					
22	672	4.6	120	57.7	125-1800	H	G	A	7-2-3½	13½	FP	No	Str	DR	DR	dP	BL	Ow	Bl	Tim 27045TW	Ros	W61A	966	CD	162	108	34	48x3	53x4	N				
23	517	4.5	322	51.3	107-2000	L	G	A	7-2-3½	13½	FP	Wa	Str	DR	DR	D-Fu	Ch	Spi	Tim 26450TW	Ros	W61A	1030	CD	192	124	34	33½	42x3	48x4	N				
24	468	4.7	229	43.4	104-2300	L	G	A	7-2-3½	13½	FP	Ha	Str	DR	DR	D-Fu	Ch	Spi	Own BX	Ros	W61A	1118	FD	192	109	33	54½	48x3½	N					
25	611	5.0	399	54.2	128-2200	L	G	A	4-3-3½	11½	PS	Os	Str	DR	DR	D-Fu	Ch	Spi	Own BQ	Ros	W61A	902	FD	192	111	33	50x3½	48x3½	N					
26	611	5.0	399	54.2	128-2200	L	G	A	4-3-3½	11½	PS	Os	Str	DR	DR	D-Fu	Ch	Spi	Own AC	Ros	W61A	1052	FD	180	109	37	48x3½	52x4	N					
27	611	5.0	398	54.2	128-2200	L	G	A	4-3-3½	11½	PS	Os	Str	DR	DR	D-Fu	Ch	Spi	Own AK	Ros	W61A	1044	FD	180	109	37	48x3½	52x4	N					
28	706	4.8	427	60.0	138-1900	L	G	A	7-2-3½	11½	PS	Os	Str	DR	DR	D-Fu	Ch	Spi	Tim 26045TW	Ros	W61A	966	CD	162	108	34	48x3	52x4	N					
29	706	4.8	427	60.0	138-1900	L	G	A	7-2-3½	11½	PS	Os	Str	DR	DR	D-Fu	Ch	Spi	Tim 27450TW	Ros	W61A	792	CD	162	108	34	48x3	52x4	N					
30	529	4.9	350	51.3	115-2200	L	G	A	7-2-3½	15	PC	Ha	Str	DR	DR	D-Fu	Yo	Spi	Tim 27045TW	Ros	W61A	966	CD	162	108	34	48x3	52x4	N					
31	707	4.9	455	60.6	150-2000	L	G	A	7-2-3½	17	PC	Ha	Str	DR	DR	D-Fu	Yo	Spi	Tim 35000H	Ros	W61A	1030	CD	192	124	34	33½	42x3	48x4	N				
32	855	4.5	550	72.2	180-2000	L	G	A	7-2-3½	17	PC	Ha	Str	DR	DR	D-Fu	Yo	Spi	Tim 35000H	Ros	W61A	1030	CD	192	124	34	33½	42x3	48x4	N				
33	282	5.0	176	33.8	73-2800	L	G	A	7-2-3½	10½	PC	No	Str	AL	AL	P-BL	Lo	Spi	Tim 30000H	Ros	L61HV	412	CD	156	109	37	40x2½	44x3	N					
34	282	5.0	176	33.8	73-2800	L	G	A	7-2-3½	10½	PC	No	Str	AL	AL	P-BL	Lo	Spi	Tim 31000H	Ros	L61HV	570	CD	168	102	34	40x2½	52x4	N					
35	501	4.6	330	48.6	110-2200	L	G	A	7-2-3½	12½	PC	Ha	Str	DR	DR	D-Fu	Lo	Spi	Tim 27050	Ros	T61A	940	D	CD	186	118½	34	41x3	56x4	N				
36	611	4.5	410	54.1	113-2000	L	G	A	7-2-3½	16½	PC	Ha	Str	DR	DR	D-Fu	Lo	Spi	Tim 27050	Ros	T61A	940	D	CD	180½	112½	34	41x3	56x4	N				
37	779	4.5	510	66.1	110-1800	L	G	A	7-2-3½	16½	PC	Ha	Str	DR	DR	D-Fu	Lo	Spi	Tim 27050	Ros	T61A	940	D	CD	180½	112½	34	41x3	56x4	N				
38	411	4.5	270	40.8	83-2100	L	G	A	7-2-3½	17	FP	Bu	Zen	V	AL	AL	P-BL	Yo	Spi	Tim 35000H	Ros	L41H	744	P	FX	216	126½	34	42x2½	58x3	N			
39	358	5.0	254	38.5	110-2800	F	G	A	7-2-3½	12½	CC	Ha	Zen	M	DR	D-O	Mo	Spi	Tim 35000N	Ros	L41HV	596	a	CF	92	91	34	42x2½	57x					



O

r g

A COMMERCIAL TRANSPORTATION DEPARTMENT

THE announcement of this new department represents the culmination of years of study and experience in the engineering of brake materials for every type of commercial vehicle.

Grey-Rock products have passed the test of millions of road miles of actual commercial service by operators under every conceivable condition. Laboratory tested, of course—but **FIELD PROVEN**.

This new department co-ordinates the company's extensive activities into a practical service of vital importance to all bus and truck operators. Its functions are clear cut. They are:—

- ① To scientifically diagnose your brake problems with you.**
- ② To recommend the specific brake materials that have been specially engineered for your particular requirements.**
- ③ To co-operate with you to insure maximum satisfaction from the use of these materials.**
- ④ To provide a convenient source of supply and ample stocks of such materials for quick delivery at any time.**

When may one of our factory-trained engineers call to demonstrate the practical usefulness of this service?

**UNITED STATES ASBESTOS DIVISION
of Raybestos - Manhattan, Inc., MANHEIM, PA.**

Grey-Rock brake friction materials offer a complete line—Grey-Rock Brake Blocks; Grey-Rock Eagle (woven); Grey-Rock Eagle Industro-Truck (woven); Grey-Rock Hi-way (woven); Grey-Rock Molded (segments and rolls); Grey-Rock Folded Molded Segments. Other Grey-Rock Products include—Clutch Facings; Fan Belts; Radiator Hose; Rivets; Bolts; Packing, etc.



The New
W & K "Traveler"

Electrically-welded pressed steel frame makes the entire chassis practically one-piece and provides greater strength and rigidity.

No rivet holes to weaken frame. No rivets or gusset plates to come loose or to add unnecessary weight.

Frame available in any desired length.

Improved fifth wheel has live rubber cushions that absorb all road shocks and add to life of truck and trailer. Tilting-type. Locking is positive and fully automatic. Interchangeable with practically all makes of semi-automatic fifth wheels.

W & K radius rods provide an easy, fine, positive adjustment of axle alignment. Their double-swivel action absolutely eliminates binding or twisting of rods and pins.

Extra long springs (46 in.) consisting of 12 Silico manganese heat-treated steel leaves ($\frac{3}{8}$ in. thick by 3 in. wide) with double wrapped eye, bushed to insure quietness and thorough lubrication.

Improved supports that are stronger, yet lighter in weight due to tubular construction. A simple, positive, trouble-proof mechanism raises or lowers the support wheels.

Extra strong axles with $2\frac{1}{2}$ in. spindles, each fitted with two tapered roller bearings.

Many other equally attractive features. Write us for complete specifications.

The
**GREATEST
VALUE
in
TRAILER
HISTORY**

The above price (f. o. b. Detroit) covers the cost of the new W & K 5-Ton semi-trailer 16 feet long exactly as illustrated, complete with upper fifth wheel, standard type running gear, and 6.00-20 dual tires. Other equipment at equally attractive prices.

The sturdiest, most advanced, light-weight semi-trailer on the market—at the lowest price! The new W & K "Traveler". It sets an entirely new standard of trailer value—an entirely new standard of economical transportation. Never before has any piece of haulage equipment provided so many pay load miles at so low a cost!

This outstanding value is made possible (1) by the vast resources and manufacturing facilities of the W & K organization, (2) by 35 years experience as manufacturers of trailers and structural steel, and (3) by a NEW SELLING POLICY that does away with factory branches, entangling sales alliances and all other unnecessary sales expense. All the "water" has been eliminated. W & K trailers are sold *direct to dealers* (or, in territories not served by any dealer, direct from factory to user) AT THE LOWEST PRICE IN HISTORY.

Truck dealers! Don't overlook this opportunity to sell your customers this greatest trailer "buy" of 1933. Get the details and judge for yourself. Write us today for complete specifications. Ask about the W & K FINANCE PLAN that helps both dealers and owners.

WHITEHEAD & KALES • DETROIT

WHITEHEAD & KALES



This great trailer value is made possible by the tremendous manufacturing facilities of the Whitehead & Kales 23-acre factory at River Rouge

SAFEST BRAKING CONTROL



Stopping a swift-moving truck is a serious job
... and Bendix has taken it seriously.

Any brake that Bendix makes is a better
brake because Bendix makes it better. The
metals it's made of are the most precisely *right*
in make-up that modern metallurgy can achieve.
The disposal of those metals, for proper meet-
ing of stresses, is correct, and mathemati-
cally exact. The limits of tolerance observed
in production are remarkably close and the

multiplied inspections amazingly thorough.

Back of it all, the basic principles of design
employed in Bendix Brakes, embodying the
famous Bendix Servo action, are sound and
time-proved beyond argument. Momentum of
the vehicle helps you stop... builds up an easy
pedal pressure into powerful stopping action.

Specify Bendix Brakes and you have gone
the whole distance toward assuring your
truck operators of complete brake satisfaction.

BENDIX BRAKE COMPANY

SOUTH BEND, INDIANA

(Subsidiary of Bendix Aviation Corporation)

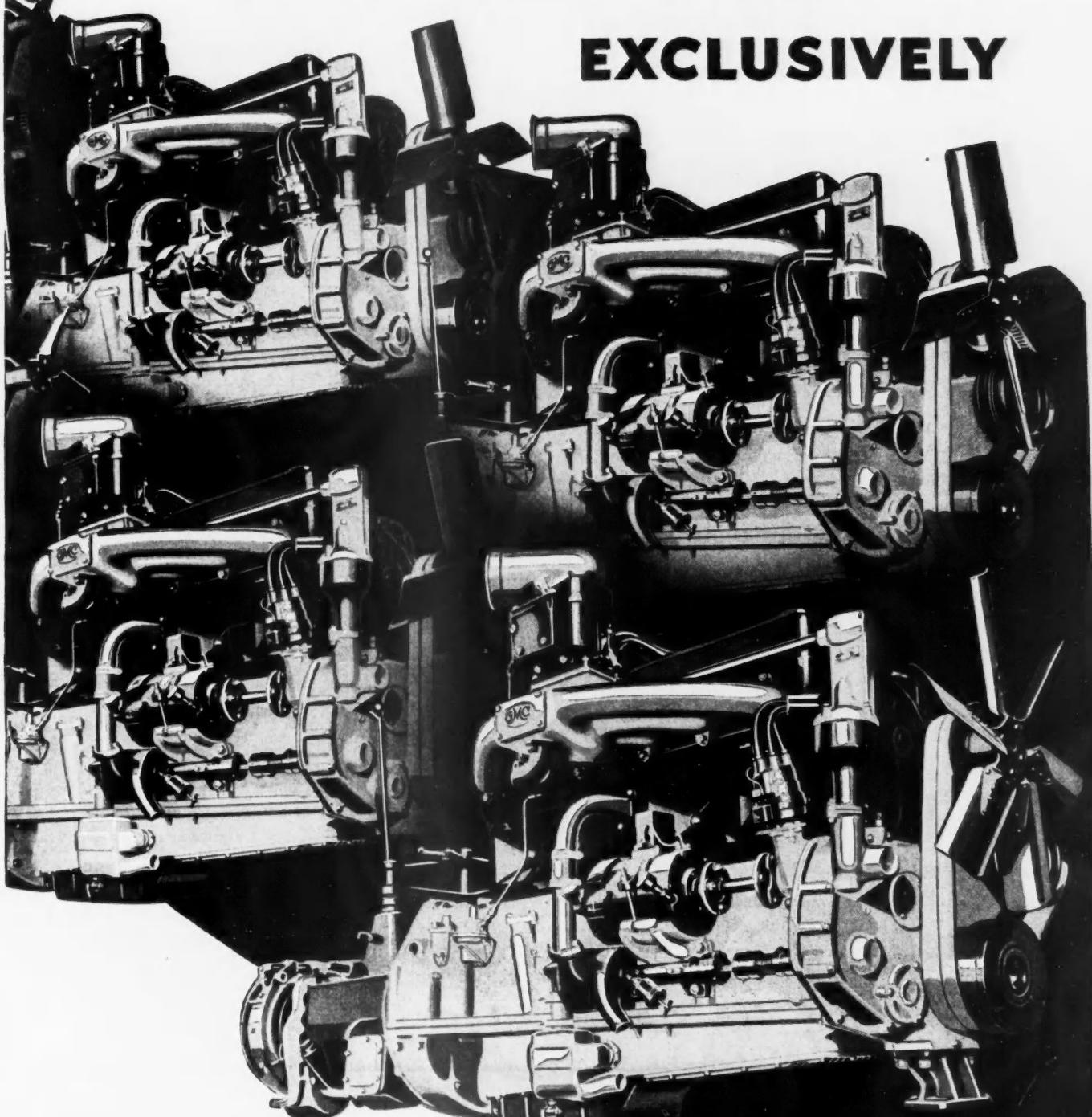
BENDIX BRAKES

FOR SAFETY

BENDIX MECHANICAL 4-WHEEL BRAKES · LOCKHEED HYDRAULIC BRAKES
BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKES · B-K VACUUM POWER BRAKES

POWERED BY
"TRUCK  BUILT"
ENGINES

EXCLUSIVELY



and Trailers

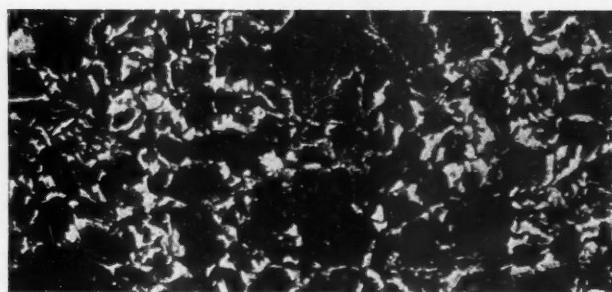
Through Our Own Y.M.A.C. Pontiac, Michigan

The Commercial Car Journal

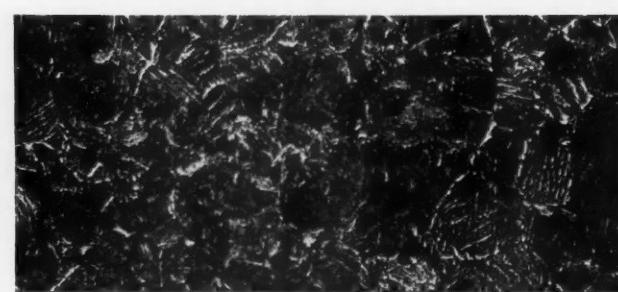
February, 1933

The Difference In Axle Shaft Service Is on the Inside—Let's Look and See

Here is some inside information on axle shafts—photomicrographs taken at the center of cross section of two different makes of shaft. The one on the left is carbon steel. The one on the right—"BILT-WELL"—is Nickel-Chromium steel. The grains show the ability of Nickel-Chromium steel to quench throughout, and the inability of carbon steel to do this. Which in plain English means that "BILT-WELL" Nickel-Chromium Steel Axle Shafts are TOUGH CLEAR THROUGH!



**XYZ Axle Shaft
Nital Etch—500 Diameters*



*"Bilt-Well" Nickel-Chromium Axle Shaft
Nital Etch—500 Diameters*

TORSION STRENGTH

Make of Shaft	Elastic Fibre Stress	Ultimate Fibre Stress	Beam Elastic	Beam Ultimate
	lbs./sq. in.	lbs.	lbs.	lbs.
"Bilt-Well"	76,500	121,300	15,000	23,800
*XYZ	66,300	109,600	13,000	21,500

TENSILE STRENGTH

Make of Shaft	Ultimate	Yield Point	Brinell
	lbs./sq. in.	lbs./sq. in.	No.
"Bilt-Well"	141,900	121,900	286
*XYZ	116,900	83,300	241

The Tensile and Torsional Strength Tests obviously show the superiority of "BILT-WELL" shafts. Certified originals of these tests are on file in our offices at York, Pa.

And here are 12 outstanding points of "BILT-WELL" superiority—12 big reasons why you can be assured of better service and greater axle shaft economy by replacing always with "BILT-WELL" Axle Shafts.

1. Every "BILT-WELL" Shaft Made of Nickel-Chromium Steel—(The Quality Standard of Axle Shaft Steel Adopted by Automotive Engineers).
2. Heat-Treated Throughout and Oil Quenched.
3. Normalized After Forging. (For Heavy Duty.)
4. Greater Tensile and Torsional Strength.
5. Splined, Key-wayed and Threaded After Heat Treatment to Avoid Cooling Cracks and Scale.
6. Ground Between Centers for Perfect Alignment.
7. Bearing Surfaces Ground to Tolerance of .0005".
8. Inspected After Every Operation.
9. Pick-Up Service from 600 Conveniently Located Jobbers, supported by Overnight Delivery from 9 Warehouses and Complete Factory Stock.
10. Complete Replacements for All Passenger Cars, Trucks and Busses Regardless of Age.
11. Nationally Advertised.
12. NET RESULT—Highest Quality and Best Service at Competitive Price.

ONLY "BILT-WELL" HAS ALL THESE POINTS
Ask for your FREE COPY of the "BILT-WELL" Manual of
Rear Axle Maintenance"

Brandt-Warner Mfg. Co.

York, Pennsylvania

Export Department, 130 W. 42nd St., New York City



Heat-Treated Right



"BILT-WELL" AXLE SHAFTS



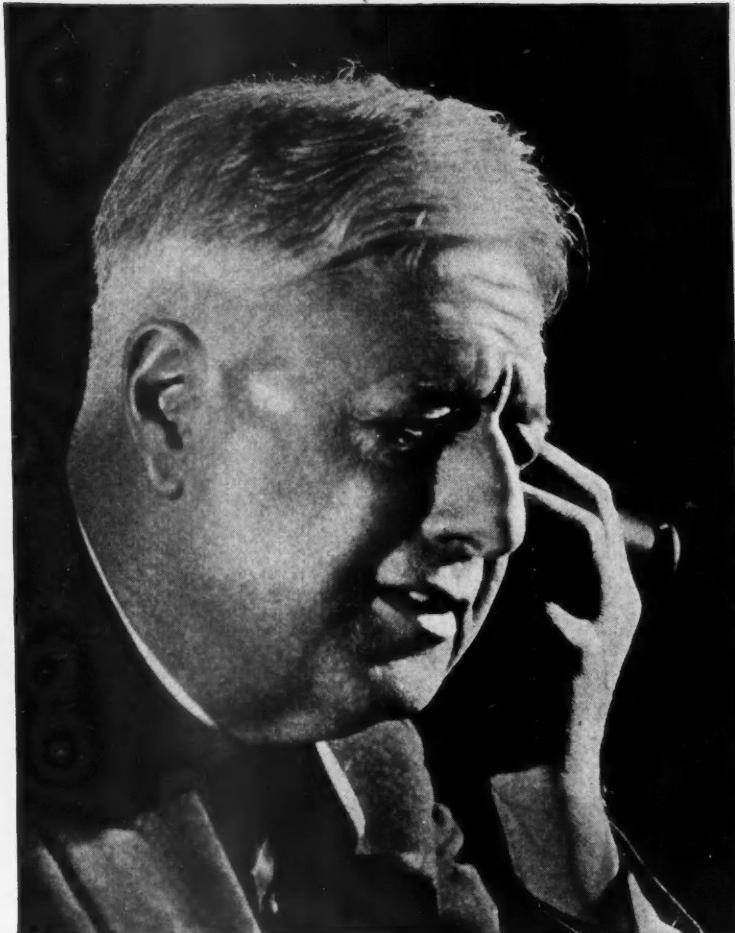
"I Buy Reliability"



"I Buy Durability"



"I Buy Power"



"I Buy Prestige"



"I Buy Ton-Miles"



"I Buy Adaptability"

"I BUY ECONOMY"

"It is my job to know what each day's dollar is worth—and to make my company's dollars do full duty. I *don't* buy things just because they are cheap. Nor do I buy things just because they are dear. If motor-truck buying were entirely a matter of initial cost, I might think less seriously of Autocars. But experience has taught me to think in terms of *long-run economy*. Initial cost is only 10% to 12% of the total operating cost of a well-built truck. I point to my preference for Autocars as proof of the fact that *I buy economy!*"

Study the Autocar Specifications in this Magazine

THE AUTOCAR COMPANY

ARDMORE, PENNSYLVANIA

TRUCKS • TRACTORS • AND LORRIES

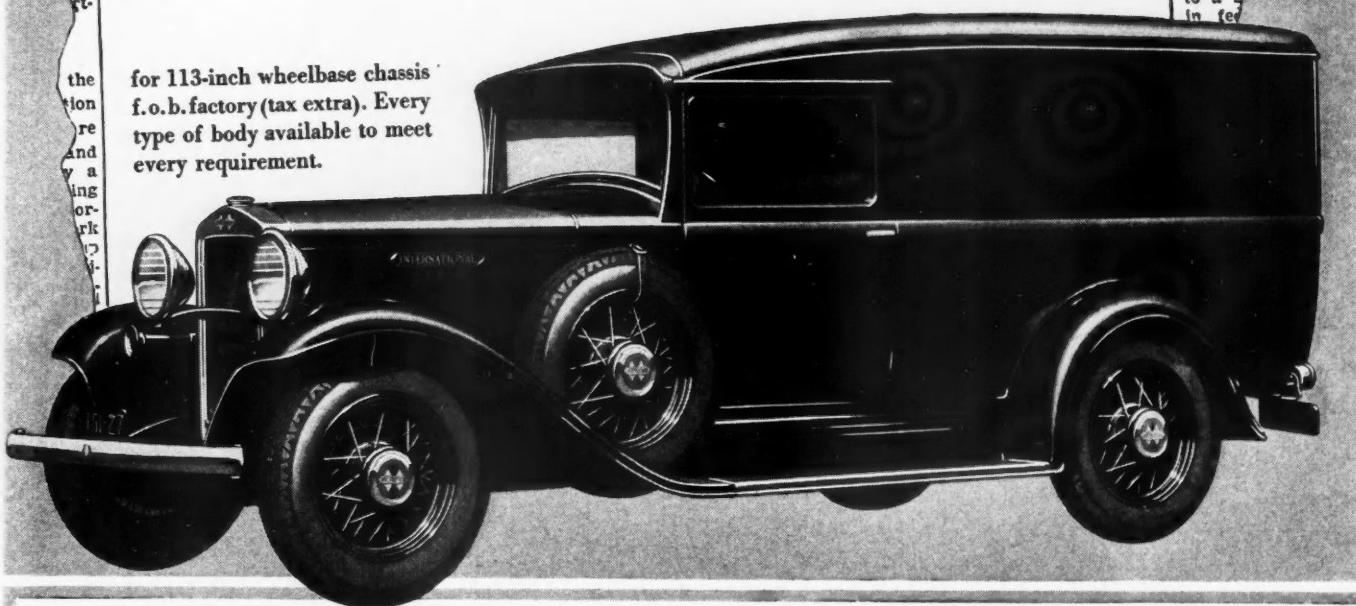
The Commercial Car Journal

February, 1933

INTERNATIONAL HARVESTER ENTERS LOW-PRICE TRUCK FIELD

**Announces Half-Ton 6-Cylinder Model
to Sell at \$360**

for 113-inch wheelbase chassis
f.o.b. factory (tax extra). Every
type of body available to meet
every requirement.



\$360

chassis f.o.b. factory (tax extra)

Rated Capacity: 1/2-ton.
Wheelbase: 113 inches.
Engine: 6-cylinder, L-head type, 3-5/16-
inch bore x 4-1/8-inch stroke. Develops
70 horsepower. Exhaust valve seat in-
serts. Full pressure lubrication. Down-
draft carburetion. Air cleaner.
Clutch: 9-inch single plate, with built-in
vibration damper.
Rear Axle: Spiral-bevel gear type. Hot-
kiss type final drive. Chrome-molybde-
num axle shafts, pressed steel housing.
Tapered-roller differential and axle-
shaft bearings.
Brakes: 4-wheel mechanical, 2-shoe type,
self-energizing, internal-expanding and
cable-controlled.
Springs: Semi-elliptic. All leaves of chrome-
vanadium steel. Self-adjusting spring
shackles.
Wire wheels: 40-spoke, 18-inch with 5.25-
18 balloon tires.
Standard equipment includes trumpet horn,
spare wire wheel, fender well tire carri-
er, front and rear fenders, and full-length
running boards. All instruments attrac-
tively grouped in panel on dash.

THOUSANDS of truck users have
long looked for a half-ton model
from International Harvester. They
have missed International *quality*
in the low-price field.

For it is on *quality* that Interna-
tional Harvester built its outstand-
ing success. Because of *quality* it
has steadily increased its leader-
ship among full-line truck manu-
facturers, greatly improving its
relative position during the recent
difficult years.

It has established this record on
chassis prices never lower than six
hundred dollars and ranging up to
more than six thousand. High rep-
utation, dependable performance,
and unfailing service have brought

new International buyers in increas-
ing thousands.

Now new conditions have given
us our opportunity. Today Interna-
tional provides another product of
high quality in the new Interna-
tional Half-Ton Model D-1.

This new 6-cylinder truck at its
remarkably low International price
takes with it every guarantee that
every International Truck carries.
It is safeguarded by the nation-wide
service that makes every Interna-
tional more valuable to its owner
throughout the years of its life.

You are cordially invited to
visit any International Branch or
dealer and see this new half-ton
International.

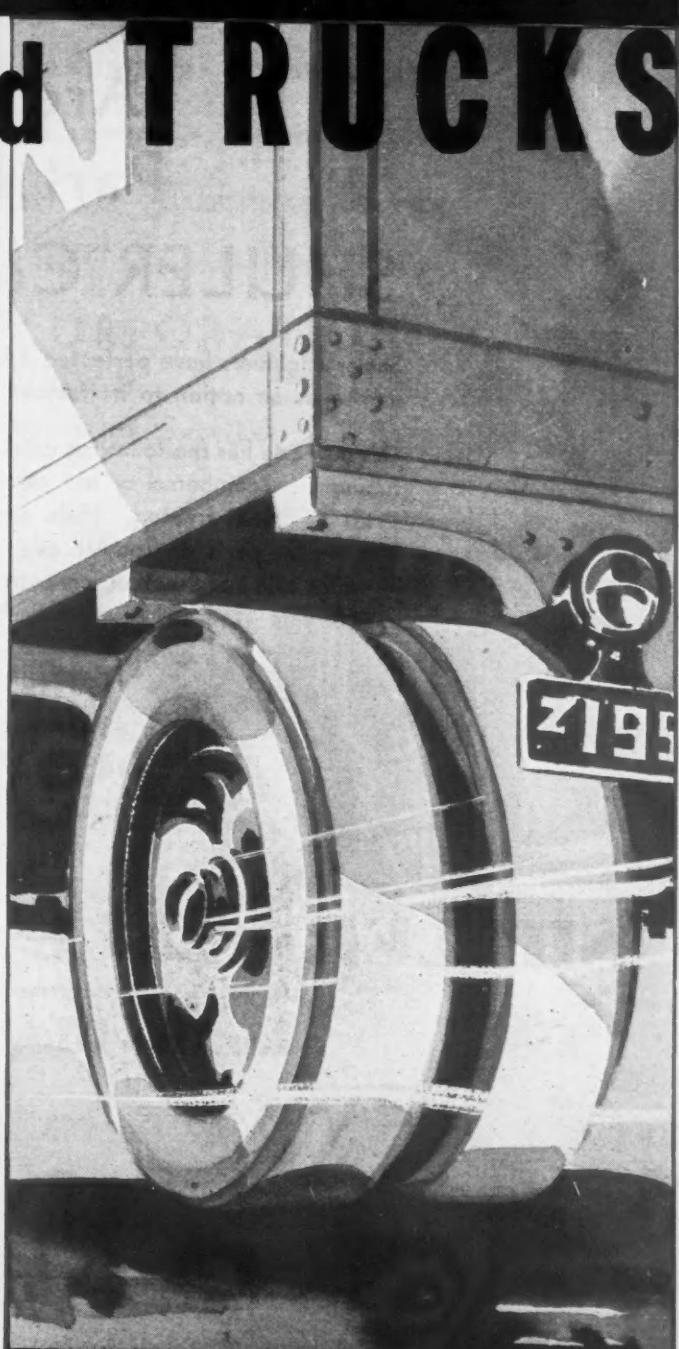
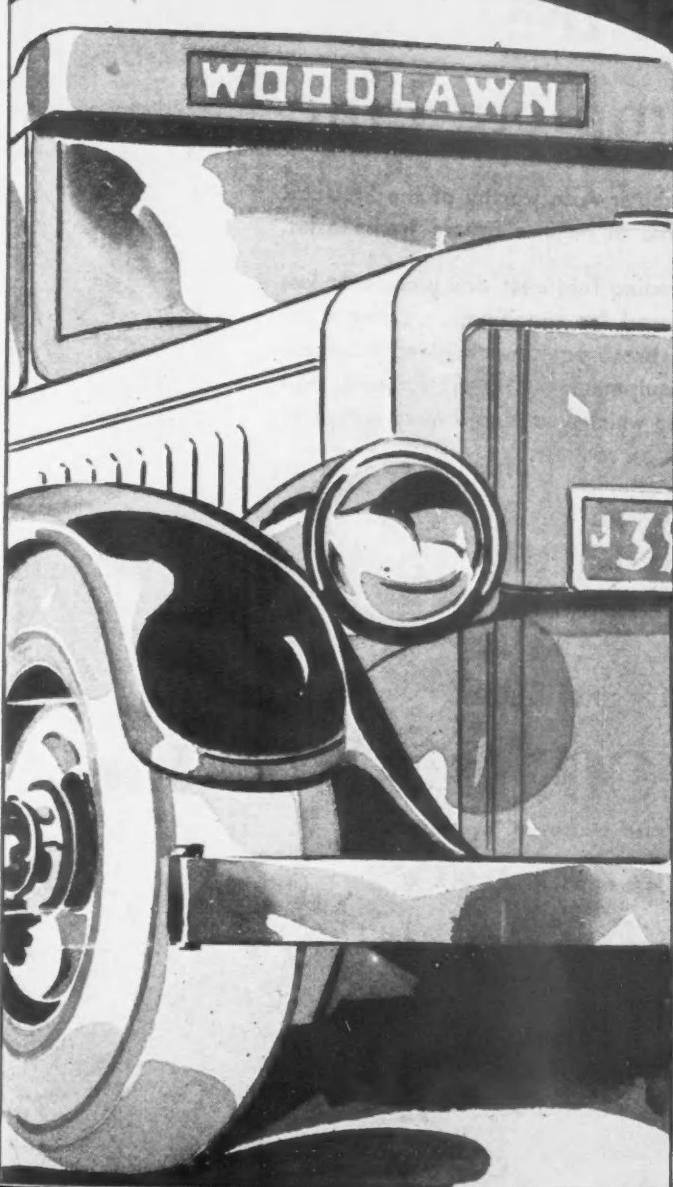
**INTERNATIONAL HARVESTER COMPANY
OF AMERICA**
606 So. Michigan Ave. (Incorporated) Chicago, Illinois

INTERNATIONAL TRUCKS

anized ★ ★

TO SERVE THE SPECIALIZED BRAKE REQUIREMENTS OF

BUSES and TRUCKS



GREY-ROCK PRODUCTS

SHULER TUBULAR TRAILER AXLES

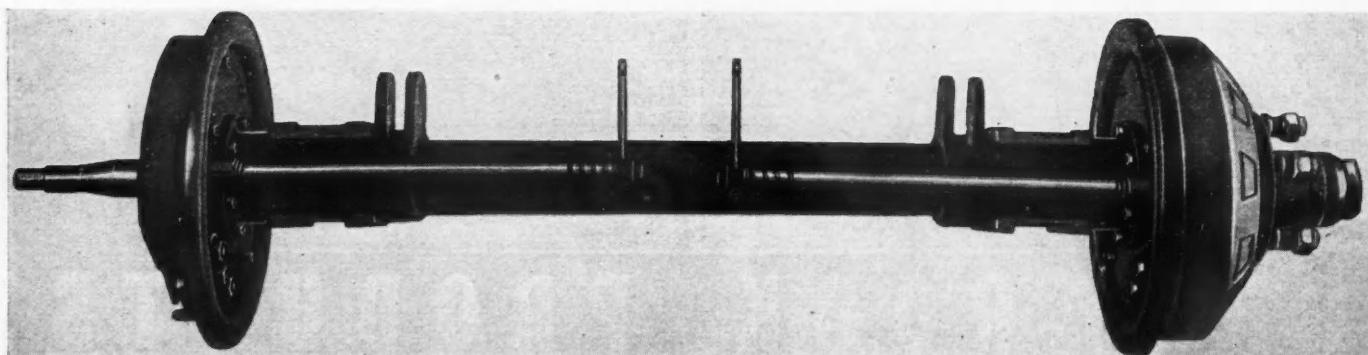
Are Now
Part of the
SHULER Complete Line

Shuler engineers have perfected a Tubular Axle worthy of the SHULER name—as an option to its famous line of regular square trailer axles.

This new axle has the following outstanding features: one piece seamless tubing . . . cambered or not cambered (as specified) . . . free from welds . . . heat treated. Hubs and brake equipment interchangeable with similar parts on regular axle equipment. A great forward step in trailer axle construction, concerning which you should have complete information. This will gladly be sent on request.

A complete line for
TRACTORS and TRAILERS
and FRONT AXLES
for
MOTOR TRUCKS and BUSES

SHULER AXLE COMPANY, Inc.
W. E. DUGAN, President and General Manager
Louisville, Kentucky



Bearings

Connecting Rod Exchange Service • Bronze-Back Babbitt-Lined Bearings • Steel-Back, Babbitt-Lined Bearings • Die-Cast Bearings (Standard and Undersize Connecting Rod and Main Bearings) • Piston Pin Bushings • Connecting Rod Bolts and Nuts • Bearing Anchor Screws • Laminum Shims • Bronze Bars and Babbitt Metals • Babbetting Service
Also Manufacturers of Tru-Pitch Marine Propellers

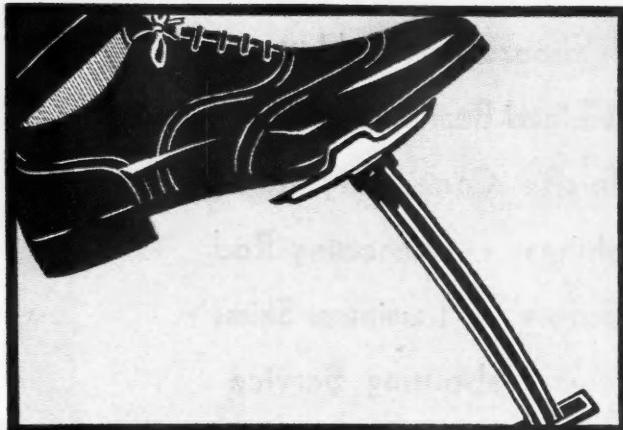
FEDERAL-MOGUL CORPORATION

DETROIT, MICHIGAN

Operating Watkins Babbetting Service

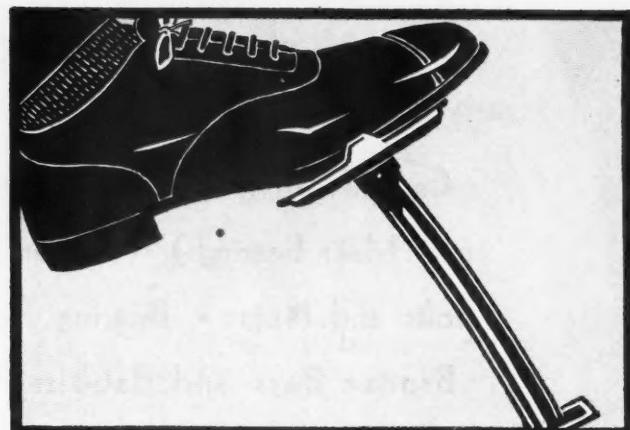


What is a "FULL"



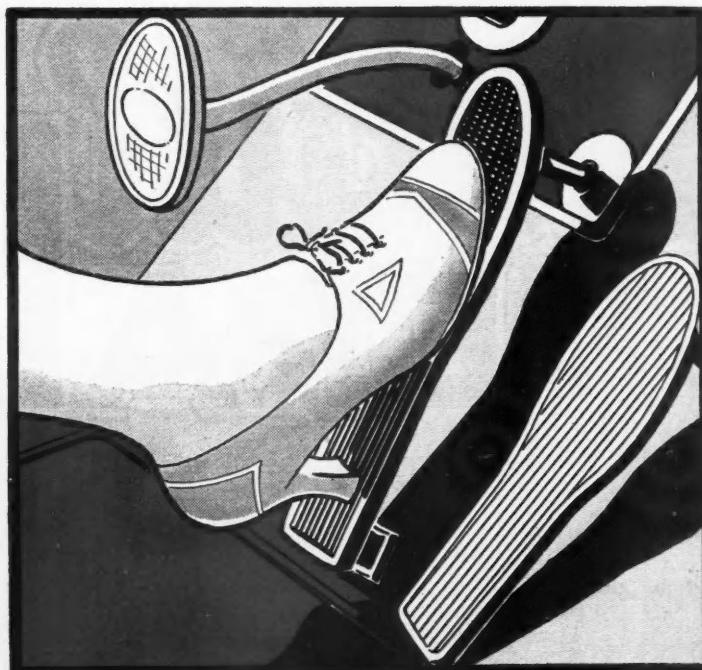
THE "HUMAN POWER" BRAKE PEDAL

This high, clumsy brake pedal is the sign of the brake system which depends upon brute force and direct leverage for applying the brakes. The time required to get the foot up on this brake pedal, the split-seconds lost and the effort required for the lunging leg action makes these pedal operated brakes unsuited for heavy cars traveling at today's high speeds.



THE "PARTIAL POWER" BRAKE PEDAL

Still looks like the old fashioned brake pedal, but employs vacuum or other booster devices to help out leg muscle in applying the brakes. Driver loses precious split-seconds in getting his foot up on this high pedal—and spends extra time, extra muscular effort in the longer pedal action required to apply the brakes. Partial Power Brakes are a compromise that falls short of the goal desired.



THE MODERN "FULL POWER" BRAKE PEDAL

This brake pedal, no higher than the foot accelerator, is the unfailing sign of Stewart-Warner Automatic "Full Power" Brakes. All the work of braking is done by the Power Unit. Driver's foot on this pedal simply controls the flow of power to the brakes with the same easy rocking motion that the foot on the accelerator controls the flow of power from the engine. In a flash the driver's foot rotates from the accelerator to brake pedal and he is braking before he could even get his foot up on a high, old-fashioned brake pedal. This is the greatest contribution to safe car control in all motor car history. Make the test for yourself!

STEWART-WARNER

POWER "Brake"

A Question That Vitally Concerns All Truck Manufacturers Who Are Interested In Keeping Step With Today's Needs

Make no mistake, this will be a power brake year. Congested traffic conditions *demand* power brakes for quick, safe stopping.

But get this straight—there is a big difference between "full power" brakes—and so-called "power" brakes, which are in reality only partial power brakes.

A "Full Power" Brake System—such as the Stewart-Warner—is not a compromise. It does *all*, not just part of the work of braking. The force is supplied by a Power Unit. The brake pedal is simply a regulator to control the *application* of power.

In a "partial power" brake, the application of the brake depends upon the driver's leg muscle assisted by vacuum or other booster devices.

The Stewart-Warner Automatic "Full Power" Brake is the most outstanding brake development in history. It is the only instantly responsive braking system to harness the

giant power of car momentum as a braking force—and put it under complete control of the driver.

It is the quickest acting, most accurately controlled brake on the market today. Braking force, in amplified response to the slightest variation of pedal pressure, is automatically distributed uniformly to all four wheels. Automatically braking force on front wheel brakes releases in proportion to the angle of turning.

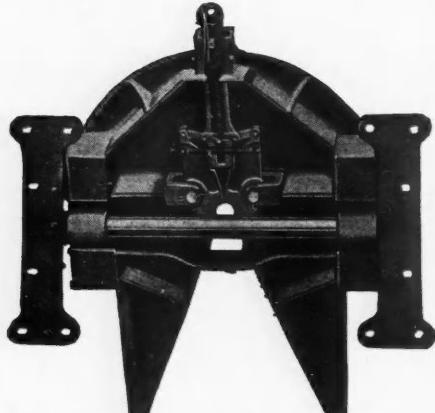
Pierce-Arrow, seeking the ultimate in brake protection to meet today's needs, chose Stewart-Warner "Full Power" Brakes.

For trucks, motor coaches and motor cars, they offer advantages in operating and maintenance economy—as well as in safety—over any system on the market. Investigate. Our Engineers are at your command. Stewart-Warner Corp., Brake Division, Chicago, U.S.A., or 6050 Cass Ave., Detroit.

**Stewart-Warner Automatic "FULL POWER" Brakes Will
Do More To Boost Truck Sales Than Any Other Feature**

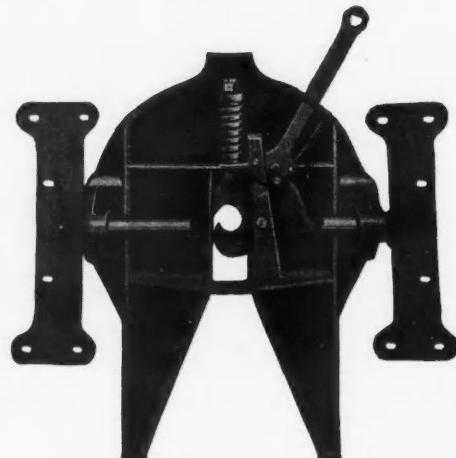
Automatic
"FULL POWER" BRAKES

B. & J. FIFTH WHEELS



B & J Model R. Full Floating Fifth Wheels are available in three sizes—Model R-1 24 inch—Model R-2 30 inch and Model R-3 36 inch. All are mounted in live rubber protecting both trailer and tractor from destructive shock and vibration. Note the wide "V" shaped self-adjusting Trailer Pin Guide. Coupling can be done from any angle. Positive action assured. No weights, no lost motion. 100% locking device fully covered by patents.

B & J Fifth Wheels are available in three types, five sizes and are priced to please everybody. The new B & J Model R, Full Floating Rubber Mounted fifth wheel pictured on the left is the last word in fifth wheel design and construction. Trailer manufacturers are invited to get complete details and prices on B & J Fifth Wheels. A complete line of pressed steel frames and the new B & J 100% enclosed Landing Gears are also available at attractive manufacturer's prices. These units are all designed and engineered to meet the most exacting requirements of today's trailer. Write or WIRE for specifications and prices. Immediate delivery guaranteed.



Model P—B & J Fifth Wheels are available in two sizes. Model P-1 24 inch and Model P-2 30 inch. Costs less than Model R but offers a rugged simple construction that guarantees years of service, and is designed to meet the demand for a less expensive wheel. Let the B & J salesman go over your trailer problems and recommend the correct B & J Fifth Wheel for your job.

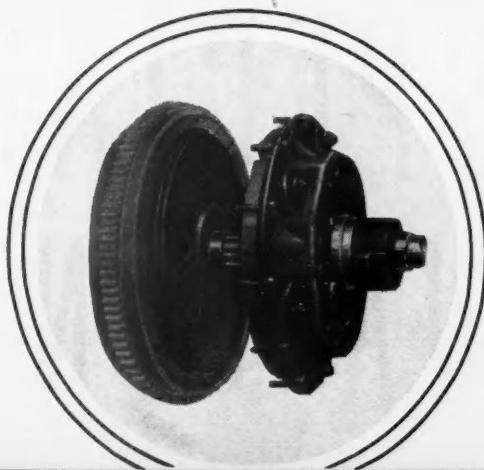
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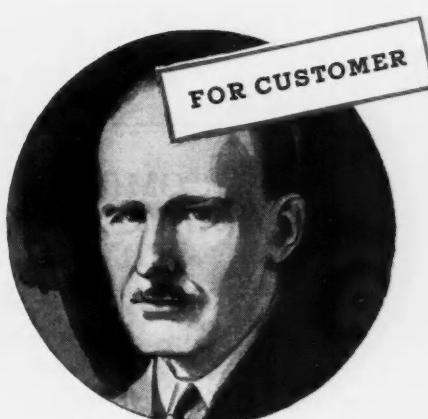
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February, 1933

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The Commercial Car Journal

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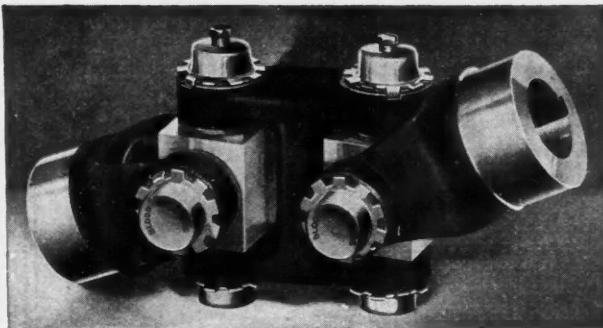
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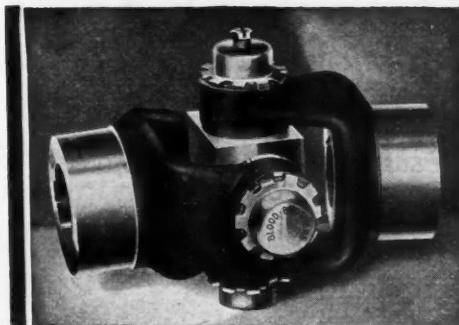
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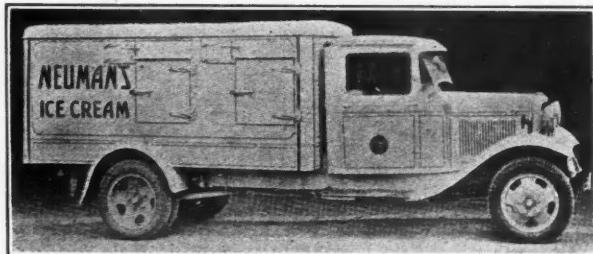
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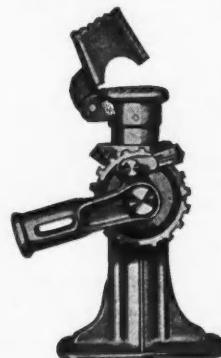
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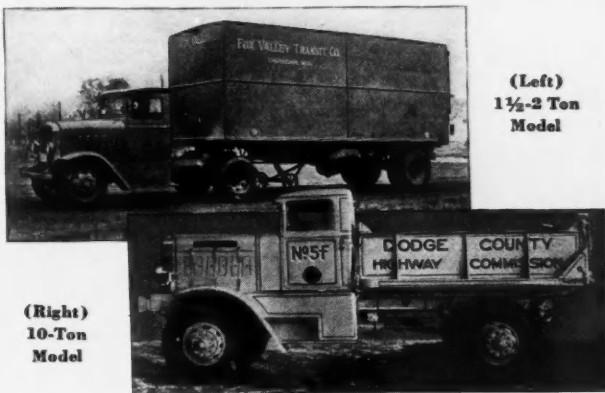
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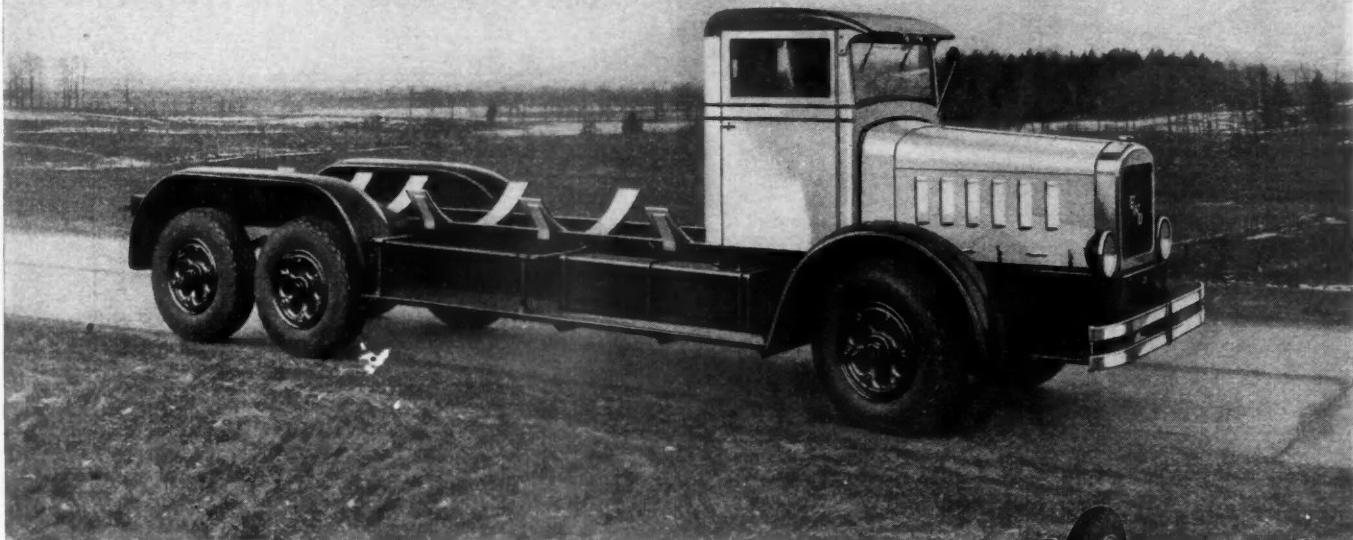
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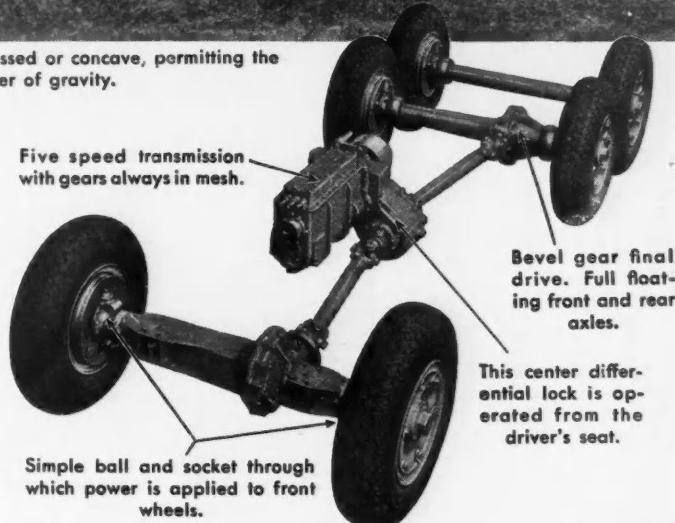


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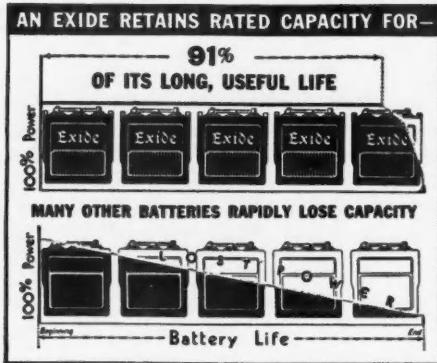
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COMMERCIAL CAR JOURNAL

FEBRUARY 1933



REO

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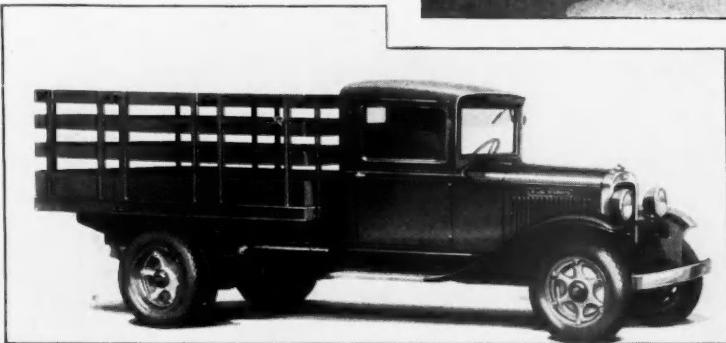
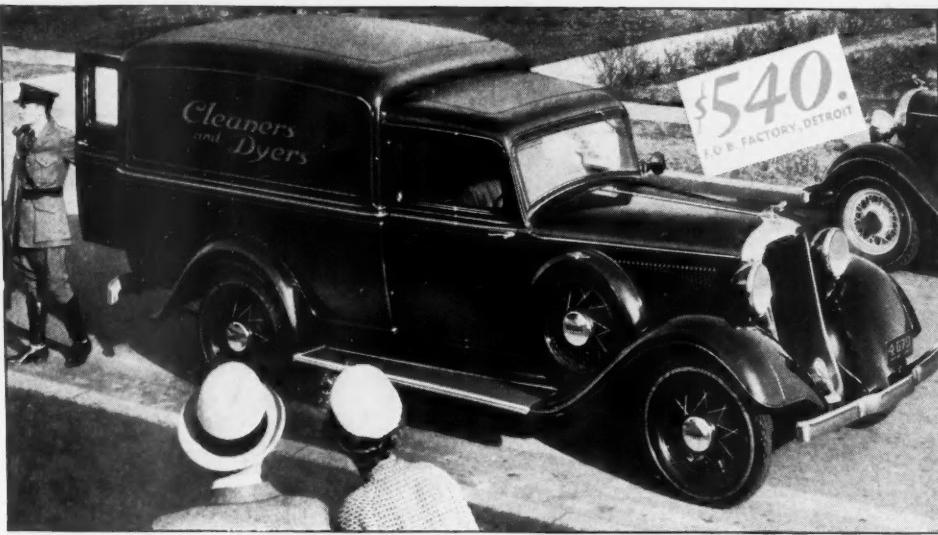
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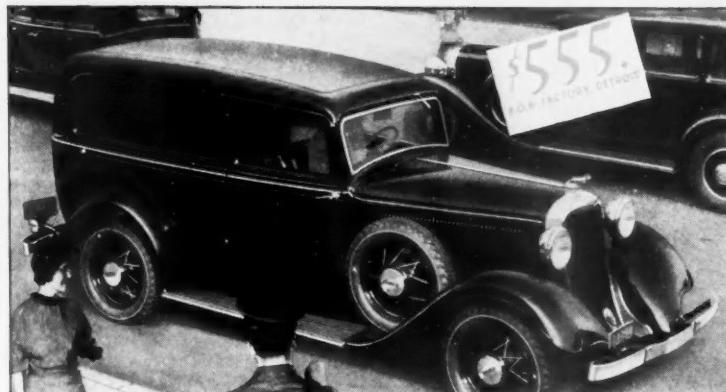
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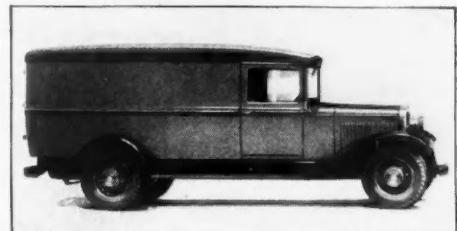
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